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PHILIPPI LANSBERGII

TRIANGVLORVM GEOMETRIÆ

LIBRI QVATVOR;

In quibus novâ & perſpicuâ methodo, & ἀποδείξει, tota ipſorum Triangulorum doctrina explicatur.

Ad Senatum Populumque Middelburgenſem,

EDITIO SECVNDA

Ab Autore recognita, multiſque in locis aucta.

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AMSTERDAMI,
Apud GVILIELMVM BLAEVW,
Anno cIↃ IↃc xxxi.

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AD AMPLISSIMOS
ET MAGNIFICOS VIROS,
CONSVLES,
TOTVMQVE INCLYTÆ MIDDELBVRGENSIVM REIPVB.
SENATVM,

Dominos ſuos plurimum obſervandos.

PHILIPPVS LANSBERGIVS.

BIBLIOTECA NAZ. ROMA VITTORIO EMANUELE

DFERO vobis ampliſſimi Viri, libros, quos de Triangulorum Geometria quos primùm in urbe veſtra concepi, poſt Goeſæ ſcripſi, & perſcripſi; nunc verò, quantâ à me fide potuit, & diligentiâ recognovi. Sed quod ſcriptores ferè omnes in operum ſuorum præfationibus facere

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conſueverunt, ut & lucubrationum ſuarum rationem, & dedicationis cauſas exponant; id mihi potiſſimùm faciundum duxi. Iam nunc enim mihi illos audire videor qui me & imprudentiæ, & temeritatis accuſent. Imprudentiæ quidem, quòd eam Geometriæ partem explicandam ſuſceperim, in cujus demonſtratione feliciter laborarunt non pauci ex priſcis Mathematicis; & quam noſtro etiam ſeculo multi magnique viri ſcriptis ſuis illuſtrarunt: temeritatis verò, quòd primum hunc, rudemque ingenii mei fœtum, Amplitudini veſtræ offerre auſus ſim. Sed facilis erit utriuſque criminis dilutio, apud eos, qui rem ipſam æſtimare, & cæcos animi affectus (interea dum ipſis reſpondero) deponere voluerint.

Quod ad primum, hoc ſanctè affirmo, non eo animo laborem hunc nobis ſuſceptum eſſe, ut eorum monumenta qui

ante

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ante nos ſcripſerunt, & immortalitati conſecrata ſunt, aut improbemus, aut è manibus ſtudioſorum abducamus: Veneramur enim, & ſuſpicimus omnes, qui in hoc ſcribendi genere verſati ſunt; imò aliorum ſcriptis non mediocriter adjutos eſſe ingenuè fatemur: Ingenui enim eſt (ut inquit ille) fateri à quo profeceris. Sed quia plærique ita ſcripſere, ut doctioribus tantùm ſcripſiſſe videantur; & fuſiùs quàm ut exiguo tempore perlegi poſſint: non inanem operam poſiturum me putavi; ſi rudiores inſtituendos deligerem, & compendio doctiores juvarem. Feci igitur quantum potui; nihil ad oſtentationem, nihil invidiæ causâ: hic unus mihi ſcopus propoſitus ut multis prodeſſem. Quod ſpero me aſſequutum eſſe: etſi enim de utilitate operis, laboriſque mei, alios; non me verba facere oporteat: hujus tamen plus ſe hinc cepiſſe fatebitur

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Lector Philomathes (ſi animum intenderit) quam ego verbis verecundè ſpondere auſim.

Cæterum quod in nomine veſtro, hanc meam lucubrationem lucem adſpicere voluerim; nemo temeritati tribuat: nam ut hoc facerem, multæ mihi graveſque cauſæ fuerunt. Prima, quòd illiberabilis & ingrati animi eſſe judicabam, hoc mei ingenii fœtu in veſtrâ urbe primùm formato, Amplitud. V. tanquam ſeminis veſtri proventu malignè ſpoliare. Altera, quòd ſi labor hic noſter literariæ Reipublicæ utilis futurus eſſet, ſub veſtro nomine longè gratiſſimum futurum putabam. Nam ut Amplitud. V. glorioſum eſt; ita ſtudiis cumprimis utile, tantos viros Mathematicarum artium patronos eſſe. Poſtremo veſtra illa in bonos humanitas, & maximè eos, quos aliquod doctrinæ nomen commendat aut literarum, im-

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impulit me, ut viciſſim ego hoc gratitudinis officio, meam erga vos voluntatem fidemque teſtarer. Quapropter cùm tot tantæque mihi cauſæ munuſculi mei Amplitud. veſtræ offerendi fuerint; ut pro veſtra ſumma æquitate benignè accipiatis,& certiſſimum meæ erga vos univerſos & ſingulos obſervantiæ μνημόσυνον eſſe ſtatuatis, obnixè rogo: Ita enim laboris operæque meæ uberrimum fructum percepiſſe videbor. Valete Ampliſſimi & Magnifici Viri. Goeſæ, III Kalend. April. Anno Chriſti CIↃ IↃ XCI.

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IN PHILIPPI LANSBERGII
TRIANGVLORVM
GEOMETRIAM
IANI DOVSÆ FILII
CARMEN.

FElix ille animi nimis, egregiuſque laboris,
Quem juvat aſſiduè niti præſtantibus anſis,
Poſſit ut infectas terrâi exſcindere peſtes,
Et penitus patrio mentem defigere cœlo.
Namque illum æterni Patris indulgentia major
Linquentem terras & ſidera mente ſequentem
Excipietque polo, & fulgentibus inferet aſtris.
Crediderim haud aliter priſcos agitaſſe parentes,
Qui primi aſtrorum leges atque ætheris omnes
Recluſere vias, & Mundi flammea tecta
Acceſſere acie mentis, doctamque per artem
Orbibus affixere ſuis palantia ſigna.
Abrahamus *Qualis & ille * Senex, ſtructâ cui filius arâ*
Mactandus ſedit, & Sethi antiquior illo
Progenies duplici cœlum ſcrutata columnâ.
Nec non Caucaſeâ pendens de rupe Prometheus,
Qui tenuem nitidis ignem furatus ab aſtris
Finxerat humanos glebaque & flumine vultus.
Et tu, quem Oeteæ rapuere ad ſidera flammæ
Atque tuo quondam libratum vertice cœlum.

Tum

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*Tum * cui conſpicuam erexit ſtatuam Atticatellus,*
Et voluit fulvo linguam fulgere metallo.
Vt taceam te magne Plato, qui, ut in æthera ferret
Sublimes oculos, homini data lumina, dixti.
Ac tot Chaldæos proceres, quoſve extulit ora
Aſſyriæ, vel ubi mediâ ſub luce Syenes
Vmbra perit. Quos tu, LANSBERGI, *ponè ſecutus*
Nil mortale putans, liquidi templa ignea Mundi
Percurrens, ſtelliſque ardentibus æthera fixum,
Tam certis ſpatiis numerorum includis Olympum, &
Momina menſuraſque doces, flexuſque receſſuſque
Innumeros; facili tot, tam diffuſa coerces
Gyro; ut proclivem aſtriferi ad penetralia cæli
Oſtendas callem doctæ ſubnixus arenæ*
Remigio; ſic non humeris ſed pectore cælum
Fulciit altus Atlas; nec equo ſed mente volavit
Atque animi pennis liquidi ad confinia Mundi
Ille, Chimeræas potuit qui vincere flammas.
Nobilis & ſummo nunc ſplendet in æthere Perſeus
Gorgonis anguicomæ domitor, qui nubila ſupra
Ventorumque leves animas & fulmina vectus
Ingenio acceſſit Superûm tonitralia templa,

De Hercule Aſtrologo *vide Feſtum. Beroſſum.*

id eſt Arithmetica & Geometria.

Bellerophon.

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AD EVNDEM.

VT cuique virtutem vigor non degener
Irritat animo vivido, aut expectorat
Imbellia infensato : ita orsis grandibus
Excelsi, inanibusque sæcla vilia
Mortalium promiscuè adlubescimus.
Hic Murciæ inter lenta curat otia:
Hic ne pigretur, inter inficetias
Sepelibiles, ignobili dispendio
Silentii festinat obsolescere.
At flammeo mens impetu, plebis procul
Minutiusculæ audet à se spernere
Molitiones, atque semita ad decus
Perenne sese inusitata emergere.
Velut Philippe, patrius minutias
Pertæsus ardor ingenî, te præpete
Nisu penetrans in recessus Musicos
Res arduas notis genî de viribus
Consulere, perplexisque gaudet schematum
Metis laboriosè arenam intexere
Circique convexam rotam, ac orbis teres
Glomeramen, aut (scrupolum opus) trianguli
Retexere cacumen trigeminum : aut solidûm
Coacta quadrantalium fastigia.
At te beatum mentis, ubi de pulvere
Te tollere audes, atque sidenti modum
Terræ pigentis ponderi præscribere

Et

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Et qua ſola & qua ſit frequens: vel impetum
Notare pernicem poli diffuſilis:
Inſigniumque noctis atræ, ſyderum
Ceſſantium ſedes, vias labentium
Privas, ſonoreſque omnium inter ſe abſonos
Melicoſque quos noto cient motu modos,
Tum ſolis offecto latebras lumine,
Lunæque defecto labores ſydere.
Divinioris ille mentis ſcilicet,
Conſultus, & mortalium ſublimior
Iſthac fuit cadaveroſa ſorte, qui
Contagione corporis mentem ſuam,
Qui animum animo dividere, & cum cœlicis
Miſcere felix occupavit cœtibus
Commercium: iſtique, genus heroum, mares
Qui liberalem vindicare murcido
Proporro curam oblivio, qui perpetrant
Mactam novo peculio protollere
Sera ad nepotum poſtumorum ſecula.

IACOBVS GRVTERVS.

Αὐτὸς εἰς τὸν αὐτόν.

Εὖγε ΦΙΛΙΠΠΕ νέον τ' Φλαύδρων κῦδ@ ἀέῤῥης,
Θνητὸς ἐὼν Φήμης ἄρχεο ἀθανάτης.
Δὸς πλυΦροντίσῃ ῳδὲ μέτρων ζεῦμα πόνοιο,
Θές τι χλέ@ κείνων σῦ τε Φαεννότερον.
Ως μίτῃ εἰχόμεν@ λαβυρίνθῃ ἕρκεα γναμπῆς:
Καὶ καπίδυ Θησεὺς δαίδαλα χ' αὐέδυ:
Τὸν μετρικὴ τρόπον εἰς διαχύσμῃ πάξιν ἀπείρῃ,
Γῆς τε πέρας ἠγεῖτ' ἠερονίης τε πόρης.
Δεύτερ@ ἦ πλυμήτῃ πίλον@, ἄγκεα ὅπις
Γῆς ναίων, κύκλῃς εἰσεπέρησ' ἀβάτης.

GEOMETRIÆ TRIANGVLORVM LIBER I.

De magnitudine rectarum linearum quæ circa Circuli peripheriam considerantur.

1.

TRIANGVLORVM Geometria est, quæ ex tribus quibuscunque, vel angulis, vel lateribus, in rectilineo aut Sphærico Triangulo datis, reliquorum laterum angulorumque dimetiendorum rationem tradit, adminiculo Canonis Triangulorum, ex magnitudine rectarum linearum, quæ circa circuli peripheriam considerantur, compositi.

Suscepta nobis est explicanda Triangulorum Geometria, rectè igitur à definitione ejus auspicamur: omnis enim quæ à ratione suscipitur de aliqua re institutio, debet à definitione proficisci, ut intelligatur id de quo disputatur. Definitio autem præmissa cum à partibus totius doctrinæ sumpta sit, valdè clara est, & sigillatim deinceps demonstrabitur.

ΠΟΡΙΣΜΑ.

Ejus itaque partes tres sunt. Prima ex primis Geometriæ elementis, rectarum linearum magnitudinem, quæ circa circuli peripheriam considerantur, demonstrat: Altera Canonis Triangulorum σύνταξιν: Postrema, usum ejus in calculo Triangulorum rectilineorum, & Sphæricorum.

2. Rectarum verò linearum quæ circa circuli peripheriam considerantur, aliæ sunt in circuli peripheria, aliæ extra, aliæ per circuli peripheriam.

Veteres Mathematici cùm solis subtensis in Triangulorum Geometria uterentur, rectarum solummodo magnitudinem quæ in circulo sunt investigabant. Nobis verò

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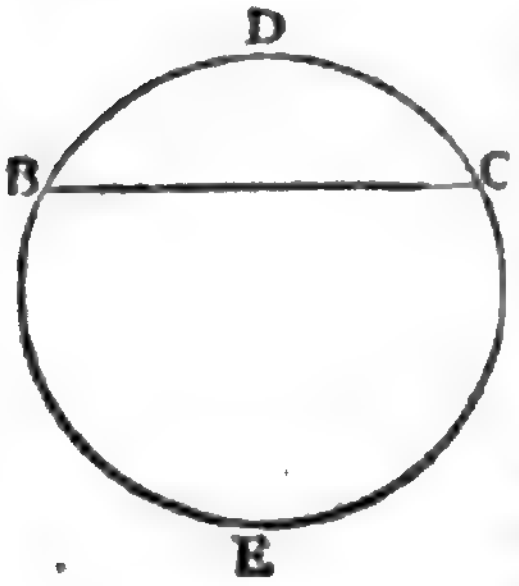
verò cùm plenior, planiorque mensiuandi ratio explicanda sit, etiam earum quæ extra & per circuli peripheriam sunt, magnitudo demonstranda est.

De magnitudine rectarum in Circuli peripheria.

3. In circuli peripheria considerantur Subtensa, & Sinus.

4. Subtensa est recta linea in circulo, dirimens eum in duo segmenta; & utrumque pariter subtendens.



Talis est in adjecto schemate recta B C. *dirimit enim circulum* B D C E *in duo segmenta,* B D C & B E C: *& utrumque pariter subtendit.*

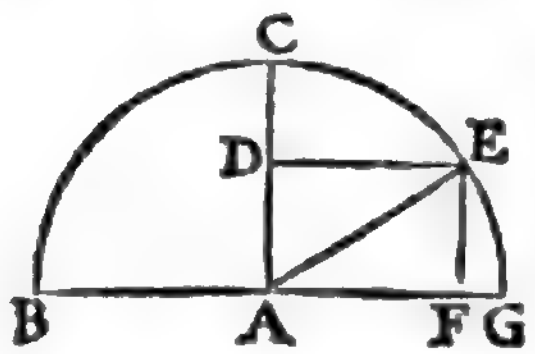
5. Sinus, est recta linea in semicirculo, ab arcus termino perpendicularis.

Vox Sinus Arabica est, & proinde barbara; sed cum longo usu approbata sit, & commodior non suppetat, nequaquam repudianda est: faciles enim in verbis nos esse oportet, cùm de rebus convenit.

6. Sinus rectus est aut versus.

Recentiores aliqui Sinum dividunt in primum & secundum: nam cum ex præmissa Sinus definitione, versus non minus perpendicularis sit quàm rectus, etiam rectum esse contendunt, & proinde vitiosam distributionem Philosopho ubi partes conveniant. Verùm cum hoc verso Sinui proprium sit, quod recto versus sit, rectus solummodò κατὰ τὶ; nulla caussa est ab usitata divisione recedendi.

7. Sinus rectus est recta linea in semicirculo, ab arcus termino perpendicularis in diametrum, dividens semicirculum in duo segmenta; ad quorum utrumque pariter refertur.



Talis est in adjunctâ figurâ recta E F; *est enim ab* E *arcus termino, perpendicularis in diametrum* B A F G; *dividitque semicirculum* B C E G *in duo segmenta,* G E, & B C E, *ad quorum utrumque pariter refertur.*

ΠΟΡΙΣΜΑ.

Itaque Sinus rectus, est semissis Subtensæ arcus dupli.

Nam quod Subtensa est in circulo, id Sinus rectus est in semicirculo, quemadmodum definitiones Sinus recti & Subtensæ, inter se collatæ ostendunt.

8. Sinus

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8. Sinus rectus peripheriæ,& complementi ſui æque poſſunt radio.

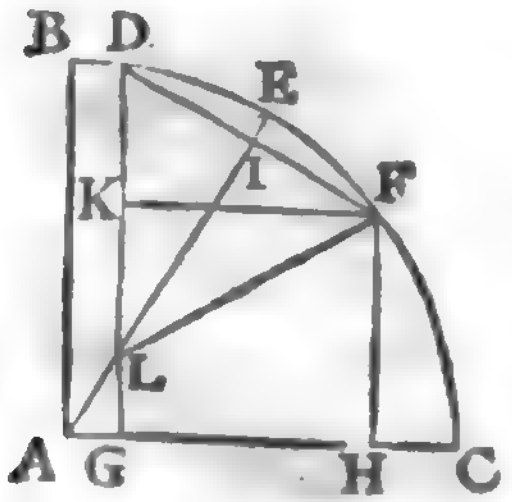
Complementum peripheriæ dicimus reliquam peripheriam datæ ad circuli quadrantem. Sit igitur in præmiſſa figura, recta E F, *ſinus rectus peripheriæ* G E *vel* B C E: *& complementi ſui* C E *ſinus rectus* E D, *vel æqualis illi* A F *per trigeſimam quartam primi elementorum. Dico* A F & E F, *æquepoſſe radio* A E. *Nam per penultimam primi Euclidis, in Triangulis rectangulis, quadrata laterum rectum angulum continentium, æqualia ſunt lateri rectum angulum ſubtendenti. Sed* A F E *eſt Triangulum rectangulum ad* F *per ſeptimam hujus, crura verò rectum ambientia ſunt* A F & E F: *æquepoſſunt ergo radio* A E *rectum angulum ſubtendenti; quod erat demonſtrandum.*

ΠΟΡΙΣΜΑ.

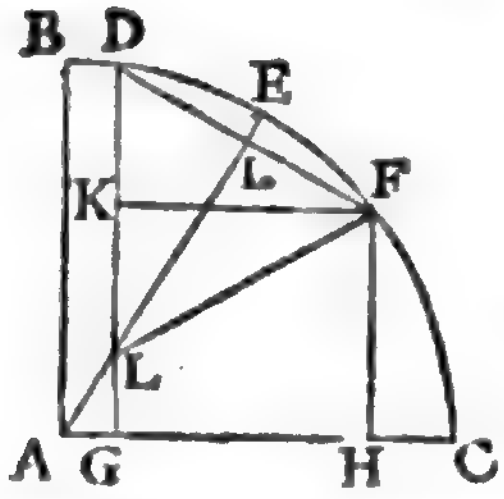
Itaque dato radio cum ſinu recto peripheriæ, datur etiam ſinus rectus complementi ſui: dempto enim ſinus noti quadrato ex quadrato radii, relinquitur quadratum ſinus complementi; cujus radix eſt ipſe ſinus quæſitus.

In exemplo ſit radius A E 10, & E F 6; *erit* D E 8: *ablato ſcilicet quadrato* E F 36, *ex quadrato radii* A E 100, & *reſidui* 64, *quadrato latere* 8 *aſſumpto.*

9. Differentia Sinuum rectorum peripheriarum duarum, à circuli ſextante æquali intervallo remotarum, æquatur Sinui recto peripheriæ alterutrius, à circuli ſextante intervalli.



Sint in quadrante A B C *peripheriæ duæ* C F & C D, *æquali intervallo ab* E *circuli ſextante remotæ; & harum recti ſinus* F H & D G: *differentia verò ſinuum* D K. *Dico* D K *differentiam ſinuum rectorũ peripheriarum datarum, æquari* D I *vel* F I, *alterutrius peripheriæ à circuli ſextante intervalli. Triangulum enim* D L F *eſt æquiangulum (nam* D L *latus Trianguli rectanguli* D I L, *æquatur* L F *lateri Trianguli rectanguli* F I L *per quartam primi elementorum: & proinde anguli ad* D & F *in Triangulo* D L F *per quintam ejuſdem æquales ſunt) Sed angulus* D L E *eſt partium* 30, *æqualis ſcilicet angulo* B A E *per ſecundam & quintam ſexti elementorum: totus itaque* D L F *eſt partium* 60. *Talium verò etiam eſt angulus ad* D & F *ſigillatim per trigeſimam ſecundam primi elementorum*



Quare cùm Triangulum DLF *æquiangulum ſit; etiam æquilaterum eſt per quintam ejuſdem: & proinde latus* DF *æquale lateri* DL; *& ſemiſſis illius* DE *per decimam primi elementorum, æqualis ſemiſſi hujus* DK: *quod erat demonſtrandum.*

ΠΟΡΙΣΜΑ.

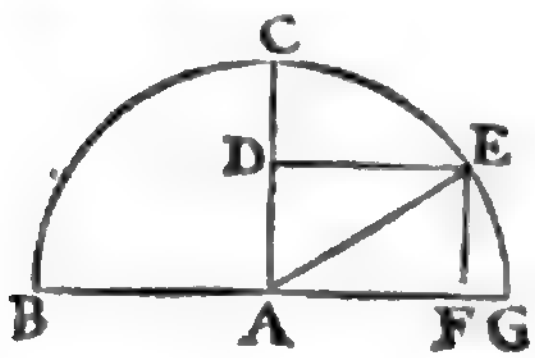
Quare, ſi duarũ peripheriarum, æqualiter à circuli ſextante remotarũ, recti ſinus dentur, etiã diſtantiæ peripheriæ alterutrius à circuli ſextante rectus ſinus innoteſcet; differentia enim ſinuũ datorum, eſt ipſe ſinus quæſitus.

In exemplo eſto peripheria CF *partium* 50, *diſtans ab* E *circuli totius ſextante partibus* 10; *& ejus rectus ſinus* FH 7660: *peripheria verò* CD, *partium* 70, *ſimili intervallo ab* E *remota; & ſinus rectus ejus* DG 9396. *Differentia ſinuum* DK 1736, *æqualis eſt ſinui recto arcus* EF *vel* ED, *partium* 10.

Quod ſi rectus ſinus peripheriæ alterutrius, cum ſinu recto diſtantiæ notus ſit, etiam reliquæ peripheriæ rectus ſinus invenietur: ablato enim ſinu recto peripheriæ diſtantiæ, ex ſinu recto peripheriæ ſextante circuli majoris, relinquitur ſinus rectus peripheriæ minoris; adjecto vero eodem ſinu diſtantiæ ad ſinum rectum peripheriæ ſextante circuli minoris, componitur ſinus rectus peripheriæ majoris.

In eodem exemplo auferatur ſinus rectus diſtantiæ FI, *vel æqualis ei* DK 1736, *ex* DG 9396, *ſinu recto peripheriæ* CD, *circuli ſextante majoris; relinquitur* KG, *vel æqualis illi* FH *per trigeſimam quartam primi elem.* 7660, *ſinus rectus* CF *peripheriæ minoris. Addantur viceverſa in unam ſummam ſinus rectus* DK 1736, *& ſinus rectus* FH, *vel* KG, 7660; *componitur ſinus rectus* DG 9396, *competens peripheriæ* CD, *ſextante circuli majori.*

10. Sinus verſus, eſt recta linea in ſemicirculo, ab arcus termino altero, ad ſinum rectum perpendicularis.



Talis eſt recta GF, *eſt enim perpendicularis ab altero termino peripheriæ* GE, *nempe* G, *in ſinum rectum* EF. *Item* BF: *nam & ea perpendicularis eſt à peripheriæ* BCE, *termino altero* B, *ad* EF *ſinum rectum peripheriæ ejuſdem.*

11. Si-

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11. Sinus peripheriæ verſus, & complementi ſui rectus æquantur radio.

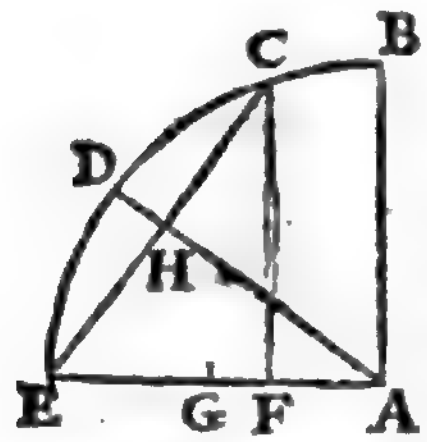
Sic in figura ſuperiori, recta F G, *ſinus verſus peripheriæ* G E ; & A F, *ſinus rectus complementi ſui æquantur radio* A F G. *Nam per communem ſententiam, Totum æquale eſt omnibus partibus ſuis ſimul ſumptis.*

ΠΟΡΙΣΜΑ.

Proinde radio dato,& ſinu recto complementi peripheriæ, datur ipſius peripheriæ ſinus verſus. Dempto enim ſinu recto complementi peripheriæ ex radio,relinquitur ſinus verſus peripheriæ datæ,quadrante circuli minoris:adjecto vero ſinu recto exceſſus peripheriæ ſuper circuli quadrantem ad radium, componitur ſinus verſus peripheriæ datæ; quadrante circuli majoris.

In exemplo detur radius A G 10, & A F 6, *rectus ſinus peripheriæ* E C, *complementi* E G *ad circuli quadrantem : erit* F G 4, *ſinus verſus peripheriæ* E G, *quadrante circuli minoris. Rurſus, ſit* C E, *exceſſus peripheriæ* B C E, *ſuper circuli quadrantem* B C ; & *ſinus rectus ejuſdem* D E *vel* A F 6, *radius* A B *ut ſupra* 10 : *erit* B A F 16, *ſinus verſus peripheriæ* B C E. *quadrante circuli majoris.*

12. Sinus rectus & verſus,æquepoſſunt ſui arcus ſubtenſæ.



Sit in quadrante B C D E, C F *ſinus rectus arcus* C E ; E F *ejuſdem peripheriæ ſinus verſus : & Subtenſa ejuſdem* C H E. *Dico*, C F *ſinum rectum*, & E F *verſum, æquari* C H E, *ſubtenſæ arcus ſui* C D E. *In rectangulis enim triangulis per penultimam primi Elementorum quadrata laterum rectum ambientium, æquantur quadrato lateris recto angulo oppoſiti : ſed Triangulum* C F E, *eſt rectangulum ad* F *per ſeptimam hujus : Latera verò rectum ambientia ſunt ſinus* C F & E F ; *oppoſitum recto angulo latus eſt* C E, *ſubtenſa arcus* C D E. *Itaque quadrata ſinuum* C F & E F, *æquantur quadrato ſubtenſæ* C E : *quod erat demonſtrandum.*

ΠΟΡΙΣΜΑ.

Quare cujuſvis peripheriæ recto ſinu, & verſo cognito, in-

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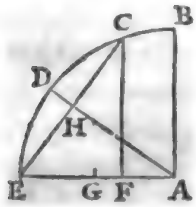
venitur & ſubtenſa ejus; & ſinus rectus peripheriæ dimidiæ: quadrati enim recti ſinus, & verſi peripheriæ aggregati radix, datæ peripheriæ ſubtenſa eſt; & ſemiſſis ejus, eſt ſinus rectus peripheriæ dimidiæ.

In exemplo ſit E F 6, *&* C F 8: *erit* C H E *ſubtenſa*, 10; *&* H E, *ſinus rectus* D E, *peripheriæ dimidiæ per πόρισμα ſeptimæ hujus* 5: *quadratum enim* E F *eſt* 36, *quadratum* C F 64; *horum aggregatum eſt* 100, *& radix ejus* 10, *proſubtenſa* C H E: *Itaque* H E *vel* H C *eſt talium* 5.

13. Sinus rectus peripheriæ in circuli quadrante, media proportione eſt ad ſemiradium, & ſinum verſum arcus dupli.



Eſto in diagrammate datus arcus E D, *ad quem duplus ſit* E C: *dico* A G *ſemiradium, eſſe ad* H E *ſinum rectum arcus* D E; *ut* H E *ad* E F, *ſinum verſum arcus dupli* E C. *Triangula enim* A H E, *&* E F C *ſimilia ſunt, ob rectos angulos ad* F *&* H *per ſeptimam hujus, communem ad* E. *Itaque latera eoſdem angulos continentia per quartam ſextæ elementorum ſunt proportionalia. Quare ut* A E *latus recto appoſitum, ad latus* C E *recto oppoſitum; ita* E H *latus minus rectum ambiens, ad* E F *latus minus rectum ambiens. Sed ut* A E *ad* C E; *ita* A G *ſemiradius ad* H E *ſemiſſem ſubtenſæ, per decimam quintam quinti elementorum. Ergo ut* A G *ad* H E; *ita* H E *ad* E F, *quod erat demonſtrandum.*

ΠΟΡΙΣΜΑΤΑ *duo.*

Itaque ſemiradio dato, & cujuſvis peripheriæ ſinu recto, datur etiam ſinus verſus peripheriæ duplæ: Nam ut ſemiradius ſe habet ad ſinum rectum peripheriæ datum; ita ſinus rectus peripheriæ datus, ad ſinum verſum duplæ.

In exemplo, ſit A G *ſemiradius* 5, *&* H E 6; *erit* E F 7 *paulò plus. Nam ut* A G 5 *ad* H E 6; *ita* H E 6 *ad* E F 7 *paulo plus, ſinum verſum* C E *peripheriæ duplæ. hinc verò rectos ſinus* A F *&* F C *invenire non eſt difficile, undecima & octava hujus hoc indicantibus.*

Dato vero ſemiradio, & ſinu cujuſcunque peripheriæ verſo, invenitur & ſinus rectus peripheriæ dimidiæ: factum enim

à ſemi-

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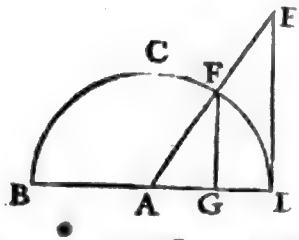
à ſemiradio per datæ peripheriæ ſinum verſum, æquatur ſinui recto peripheriæ dimidiæ.

In eodem exemplo, detur AG *ſemiradius* 5; *&* FE *ſinus verſus peripheriæ* CE 7: *erit* HE *ſinus rectus peripheriæ dimidiæ* 6 *ferè. Nam ut* AG 5 *ad* HE: *ita* HE *eſt ad* FE 7. *Factus verò ab* AG 5, *per* FE 7, *ſcilicet* 35, *eſt æqualis facto per ſe, per vigeſimam ſeptimi Euclidis. Quare hujus radix quadrata* 6 *fere,* HE *ſinui recto peripheriæ dimidiæ competit.*

De quantitate rectarum extra circuli peripheriam.



14. Extra circuli peripheriam conſideratur recta peripheriam tangens.

Talis eſt recta DE, *tangit enim peripheriam* FD.

15. Tangens peripheriæ eſt recta linea, extremo diametri perpendicularis, in radium per arcus terminum continuatum; ipſi arcui & reliquo ad ſemicirculum competens.

Ita in præmiſſa figura, tangens DE *eſt perpendicularis extremo diametri* BAD, *in radium* AF *continuatum per arcus terminum* F: *competens arcui* FD, *& reliquo ad ſemicirculum* BCF.

16. Tangens peripheriæ ſe habet ad radium; ut peripheriæ ſinus rectus ad ſinum rectum complementi.

Eſto in præcedenti figura recta ED, *tangens peripheriæ* FD; *& ejuſdem rectus ſinus* FG, *complementi* AG: *radius* AD. *Dico rationem* ED *ad* AD *eſſe, ut* FG *ad* AG. *Triangula enim* AFG, *&* AED, *ſunt æquiangula, ob rectos angulos ad* D *&* G, *communem ad* A. *Itaque per quartam ſexti elementorum latera habent proportionalia.*

ΠΟΡΙΣΜΑ.

Quare ſinu recto peripheriæ cujuſvis, & complementi cognito, ejuſdem tangens non latebit. Nam ut rectus ſinus complementi peripheriæ ſe habet ad ſinum rectum ipſius peripheriæ: ita radius ad tangentem ejuſdem.

In exemplo, ſit AG 6, FG 8, *&* AD 10; *erit* ED 13 *paulo plus. Nam ut* 6 *ad* 8; *ita* 10 *ad* 13 *paulo plus.*

17. Ra-

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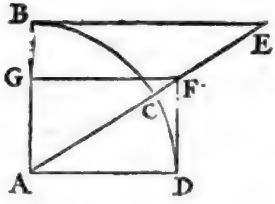
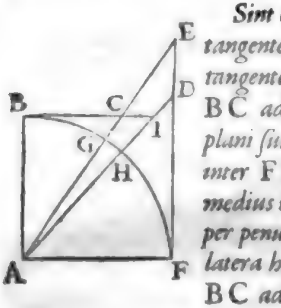
17. Radius media proportione eſt ad tangentes peripheriæ, & complementi.



Eſto recta F D, *tangens peripheriæ* D C; *complementi verò* B C, *tangens* E B: *radius* A B, *vel* A D. *Dico* A B, *vel* A D *radium, media proportione eſſe ad* D F *&* B E, *tangentes peripheriarum* D C *&* B C. *Triangula enim* A D F (*vel* A G F *per trigeſimam quartam primi elementorum*) *&* A B E *ſunt æquiangula, ob rectos angulos ad* B *&* D (*vel* G) *communem ad* A. *Itaque per quartam Sexti elementorum, ut* G A, *tangens peripheriæ* C D, *ad* G F *radium: ita* A B *radius, ad* B E *tangentem complementi* B C.

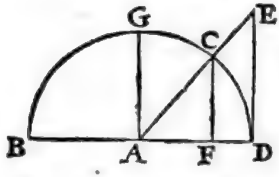
ΠΟΡΙΣΜΑ.

Quare tangentes arcuum complementorum ſuorum tangentibus reciprocè proportionales ſunt.



Sint enim in adjuncto ſchemate arcuum F H *&* F G, *tangentes* F D *&* F E; *&complementorum* B G *&* B H, *tangentes* B C *&* B I. *Dico rationem* F D *ad* F E *eſſe, ut* B C *ad* B I. *Nam per vigeſimam octavi Euclidis, Similes plani ſunt, inter quos unus proportionalis medius intercidit. Sed inter* F D *&* B I, *item* F E *&* B C, *unus proportionalis medius intercidit, nempe radius: ſimiles ergo plani ſunt. Sed per penultimam definitionem ſeptimi Euclidis ſimiles plani latera habent proportionalia: Quare, ut* F D *ad* F E, *ita* B C *ad* B I; *quod erat demonſtrandum.*

De magnitudine rectarum per circuli peripheriam.



18. Per circuli peripheriam conſideratur recta peripheriam ſecans.

Talis eſt recta A E; *ſecat enim peripheriã* D C B *in* C.

19. Secans peripheriæ, eſt recta linea per peripheriæ terminum, in tangentem ducta; peripheriæ ſectæ & reliquæ ad ſemicirculũ competens.

Ita in præmiſſa diagrapha, ſecans A E *ducta eſt per terminum peripheriæ* D C *in tangentẽ* E D: *competitque peripheriæ* C D, *& reliquæ ad ſemicirculum* B C.

20. Ra-

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20. Radius media proportione eſt ad peripheriæ ſinum rectum, & ſecantem complementi.

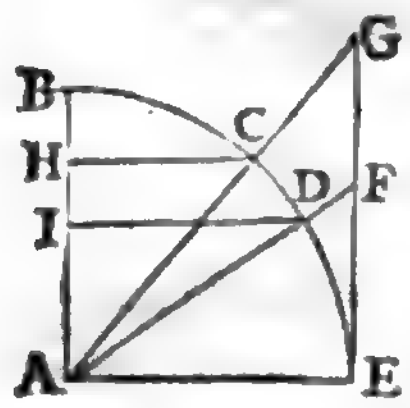
Eſto in figura ſuperiori A F, *ſinus rectus peripheriæ* G C; & A E *ſecans peripheriæ* C D *(complementi prioris ad circuli quadrantem) dico* A F *ſinum peripheriæ* G C *eſſe ad* A C *radium, ut* A D *radius ad* A E *ſecantem complementi. Triangula enim* A F C, & A D E, *ſunt æquiangula; ob rectos angulos ad* F & D, *communem ad* A. *Itaque per quartam ſexti elementorum, ut* A F *ad* A C; *ita* A D *ad* A E: *quod erat demonſtrandum.*

ΠΟΡΙΣΜΑΤΑ *duo.*

Itaque ex ſinu recto cujuſvis peripheriæ, etiam complementi ſecans datur: ut enim peripheriæ datæ ſinus rectus ſe habet ad radium; ita radius ad ſecantem complementi.

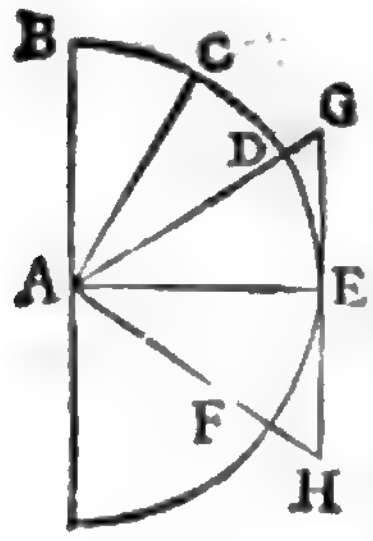
In exemplo ſit A F 5, & A D 10: *erit* A E 20. *Nam ut* 5 *ad* 10; *ita* 10 *ad* 20, *ſecantem* A E.

Et ſecantes arcuum complementorum rectis ſinibus reciprocè proportionales ſunt.

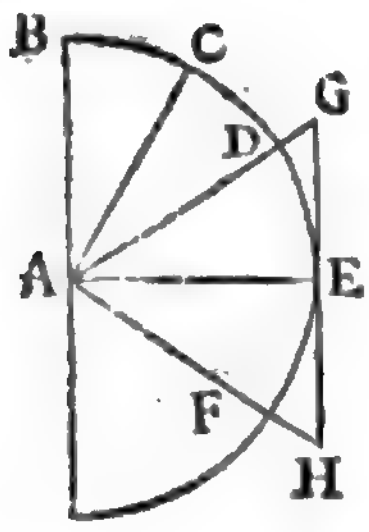


Sint enim in adjunctâ diagraphâ, arcuum E D & E C, *ſecantes* A F & A G; *complementorum verò ſinus* A I & A H: *Dico* A F *eſſe ad* A G; *ut* A I *ad* A H. *Nam per* 20 *octavi Euclidis: Similes plani ſunt inter quos unus proportionalis medius intercidit. Sed inter ſecantes peripheriæ, & complementorum ſinus, radius eſt medius proportionalis: quare* A F, A I, *item* A G, A H, *ſimiles plani ſunt. Sed per penultimam definitionem ſeptimi Euclidis, Similes plani latera habent proportionalia: Ergo, ut* A F *ad* A G; *ita* A I *ad* A H; *quod erat demonſtrandum.*

21. Secans arcus æqualis eſt Tangenti dati, & ſemiſſis complementi.



Eſto arcus D E, *ſecans* A G, *tangens* G E: *Complementi verò arcus* B D, *ſemiſſis* B C *(vel æqualis ei* E F*) tangens* E H. *Dico ſecantem* A G, *æqualē eſſe* E G *tangenti arcus dati, &* E H *ſemiſſis complementi. Angulus enim* G A H, *eſt æqualis angulo* C A E *ex theſi; angulus verò* E A H *eſt æqualis angulo* B A C. *Itaque angulus* E H A, *vel* G H A, *eſt prioris complementum, per trigeſimam ſecundam primi elementorum:*



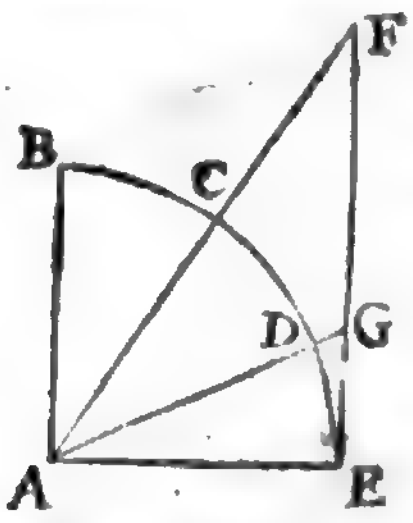
& proinde æqualis angulo C A E. *Quare cùm in Triangulo* G A H, *anguli ad* A *&* H *æquentur; manifestum est Latera* G A *&* G H *per sextam primi elementorum etiam æquari: quod erat demonstrandum.*

ΠΟΡΙΣΜΑ.

Quare arcus tangente, & complementi semissis simul additis, componitur dati arcus secans.

Adjiciatur enim E G. *tangens arcus* E D, *ad* E F *complementi semissis tangentem* E H; *componetur* H G, *& æqualis ei* A G *secans peripheriæ* D E.

22. Secans arcus, circuli quadrantis semisse minoris, cum tangente ejusdem, æqualis est tangenti peripheriæ datæ & semissis complementi.



Esto peripheriæ D E, *secans* A G; *tangens* E G: *complementi* B D, *semissis* D C; *tangens verò arcus* C D E, *recta* E G F. *Dico rectam* A G, *cum recta* G E, *æquari rectæ* F E. *Angulus enim* A F E, *æqualis est angulo* B A C (*nam ut* B A C *anguli complementum est anguli* F A E: *ita etiam* A F E) *Sed huic æqualis est* F A G *ex thesi: ergo anguli* A F G *&* G A F *per sextam primi elementorum æquantur. Et proinde recta* A G, *æqualis rectæ* F G; *& rectæ* A G, G E *simul, æquales rectæ* F G E: *quod erat demonstrandum.*

ΠΟΡΙΣΜΑ.

Itaque peripheriæ datæ secans, & tangens simul additæ, componunt tangentem peripheriæ, semissis complementi auctæ.

Nam secans A G *& tangens* G E, *æquantur* F E *tangenti peripheriæ* E D, *auctæ semisse complementi* C D. *Quare adjecta* E G *ad* A G, *componitur* F E *tangens peripheriæ* C E.

Atque ita rectarum quæ in circuli peripheria, extra, & per circuli peripheriam considerantur, magnitudo demonstrata est, reliquus est doctrinæ hujus usus, sequenti libro indicandus.

GEO-

GEOMETRIÆ TRIANGVLORVM

LIBER II.

De Canonis Triangulorum Syntaxi.

1. EX ſuperioris doctrinę fundamentis, Canonem Triangulorum componere non eſt difficile, certis hypotheſibus ad hoc aſſumptis.

Geometriæ Triangulorum pars ſecunda nobis poſita fuit in Syntaxi Canonis Triangulorum, ea igitur hoc libro demonſtranda eſt.

2. Canon Triangulorum eſt, qui in aſſumpta circuli, & dimetientis menſura, omnium circuli quadrantis partium, ſcrupulorumque primorũ, Sinus, Tangentes, & Secantes continet.

Veteres (ut ſupra dictum) ſolis ſubtenſis utebantur, & proinde Triangulorum canonem appellabant eum, qui omnium ſemicirculi partium ſubtenſas continebat. Iam verò cùm præter ſubtenſas & ſinus, etiam tangentes, & ſecantes, circa circulum conſiderentur, ſunt & eæ in Canonem Triangulorum referendæ.

3. Menſura circuli aſſumitur partium c c c l x, pars l x ſcrupula prima, unum ſcrupulum primum l x ſecunda poteſt; & ita deinceps.

Hæc circuli diviſio eſt Ptolemæi, & recentiorum Mathematicorum; valde idonea ad numerationem: inter minores enim numeros nullus adeò multiplices partes habet, Vnciam, ſextantem, quadrantem, trientem, quincuncem, ſemiſſem, ſeptuncem, beſſem, dodrantem, dextantem, deuncem, & aſſem. Retinenda igitur eſt, & ad eam aliæ proportionaliter accommodandæ ſunt.

4. Dimetiens circuli ſtatuitur particularum 20000000.

Ptolemæus diametrum aſſumit particularem 120: *Arzahel* 300. *Neoterici* 20000000 *particularum eam ſtatuunt: quæ menſura retinenda eſt; nam cùm plurium particularum ſit, plenius diameter ſecatur, & proinde à multis ſubdiviſionibus logiſta liberatur.*

5. Qualium dimetiens ſtatuitur particularum 20000000, talium latus ſexanguli circulo inſcripti eſt 10000000.

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Nam per 15 *quarti elementorum latus ſexanguli circulo inſcripti eſt æquale radio. Radius autem diametri ſemiſſis eſt, quare dimidiata diametri menſura* 20000000, *datur radius, & æquale ei Sexanguli latus, particularium* 10000000.

6. Trianguli, 17320508 ferè.

Nam per 12 *decimitertii Euclidis, Latus Trianguli circulo inſcripti potentiâ eſt triplum radii: Radius autem eſt particularum,* 10000000; *ergo potentia ejus triplicata eſt particularum* 300000000000000, *& latus ejus* 17320508 *ferè.*

7. Quadranguli 14142136.

Per ſextam enim quarti elementorum, Recta quadrantem circuli ſubtendens, eſt latus quadranguli circulo inſcripti: poteſt autem ea per penultimam primi elementorum duplum radii. Itaque potentia quadranguli eſt 200000000000000: *& ejus latus* 14142136.

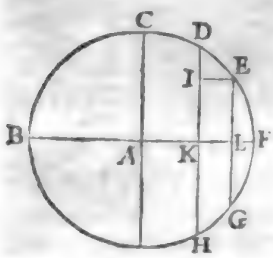
8. Decanguli 6180430.

Nam per nonam decimitertii Euclidis, decanguli Latus, eſt ſegmentum minus rectæ lineæ extrema & media ratione ſectæ, Latus ſexanguli & decanguli ſimul menſurantis. Itaque per undecimam ſecundi elementorum ablato ſemiradio 5000000, *ex quadrato latere radii & ſemiradii aggregato* 11180340: *relinquitur decanguli latus* 6180430.

9. Quinquanguli 11755704 ferè.

Nam per decimam decimitertii Euclidis, Latus quinquanguli in circulum inſcripti, poteſt latus ſexanguli & decanguli. Sed ſexanguli latus eſt particularum 10000000, *per quintam hujus: decanguli* 6180430 *per præmiſſam. Itaque per penultimam primi elementorum Quinquanguli latus eſt* 11755704 *ferè.*

10. Quindecanguli 4158234 ferè.



Nam per decimamſextam quarti elementorum, recta inſcripta inter baſim Trianguli & Quinquanguli, ab eodem puncto in circulum ducti eſt latus Quindecanguli. Atqui talis eſt DE *in adjuncta figura, inſcripta inter baſim Trianguli* DH *& Quinquanguli* EG, *à* B *eodem puncto in circulum ducti: eſt ergo latus Quindecanguli. Hujus porro magnitudo inveſtigatur hoc modo: datur* DKH *latus Trianguli per* 6 *hujus* 17320508 *ferè, &* ELG *Quinquanguli latus per præmiſſum* 11755704 *ferè. Itaque per* 7 *primi Triangulorum* DK *eſt* 8660254; EL 5877852, *ſinus recti peripheriarum* FD *&* FE: *& differentia eorum* DL 2782402. *Per* 8 *verò ejuſdem* AK *eſt* 5000000;

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5000000; AL 8090170 *ſinus recti complementorum* CD & CE: *& differentia eorum* KL *vel* IE 3090170. *Quare cùm in Triangulo* DIE *rectangulo ad* I, *detur latus* DI 2782402, & IE 3090170: *per penultimam primi elementorum latus* DE *Quindecanguli eſt particularum* 4158234 *fere; quod erat demonſtrandum.*

11. Si Trianguli, Quadranguli, Quinquanguli, Sexanguli, Decanguli, & tandem ipſius Quindecanguli laterum ſemiſſes aſſumantur, ut angulorum dimidiorum ſinus: & ex his complementorum ſingulorum, ſemiſſiumque ſinus continuè inveſtigentur; & contra, totus ſinuum Canon hac inductione componitur.

	Sint inſcriptæ laterum ſuprà inventæ.			*Aſſumanturque horum ſemiſſes, ut angulorum dimidiorum ſinus per ſeptimam primi Triangulorum.*	
Trianguli	120.	17320508	*per* 6 *hujus.*		
Quadranguli	90.	14142196	*per* 7		
Quinquanguli	72.	11755704	*per* 9		
Sexanguli,	60.	10000000	*per* 5		
Decanguli, &	36.	6180340	*per* 8		
Quindecanguli	24.	4158234	*per* 10	*Partium*	60 8660254.
					45 7071068.
					36 5877852.
					30 5000000.
					18 3090170.
					12 2079117.

Dico ex harum peripheriarum ſinibus datis, reliquarum quadrantis peripheriarum ſinus datum iri: Si continuè harum complementorum, ſemiſſiumque ſinus determinentur, & contrà. Elementum veritatis ſuæ cauſam aliam non deſiderat, quàm inductionem ab experientiâ factam, quæ in hoc genere ſufficit, cùm numeri ſenſibus ſubjecti ſint. Aſſumatur igitur exempli gratiâ arcus partium 12, *ejuſque ſinus* 2079117; *adhibeatúrque præſentis elementi methodus, hinc ſequentium peripheriarum ſinus dabuntur.*

Continuæ ſemiſſes ex periph. partium 12 deductæ.	& earum ſinus per 12 vel 13 primi hujus.	*harumque complementa.*	*& ſinus per 8 primi hujus.*
6	1045285.	84	9945219.
3	523360.	87	9986295.
1 30	261769.	88 30	9996573.
0 45	130896.	89 15	9999143.

& horum ſemiſſes,	*& ſinus per 12 vel 13 primi hujus.*
42	6691306.
21	3583679.
10 30	1822355.
5 15	915016.
43 30	6883546.
21 45	3705574.
44 15	6977905.
harúmque complementa,	*& ſinus per 8 primi hujus.*
48	7431448.
69	9339804.
79 30	9832549.
84 45	9958049.
46 30	7253744.
68 15	9288096.
45 45	7160319.
rurſuſque horum ſemiſſes,	*& ſinus per 12 vel 13 primi hujus.*
24	4067366.
34 30	5664062.
17 15	2965416.
39 45	6394390.
23 15	3947439.
& complementa,	*& ſinus per 8 primi hujus.*
66	9135455.
55 30	8241262.
72 45	9550199.
50 15	7688418.
66 45	9187912.
iterumque ſemiſſes horum,	*& ſinus per 12 vel 13 primi hujus.*
33	5446390.
16 30	2840153.
8 15	1434926.
27 45	4656145.
& complementa,	*& ſinus per 8 primi hujus.*
57	8386706.
73 30	9588197.
81 45	9896514.
62 15	8849876.
horúmque ſemiſſes,	*& ſinus per 12 vel 13 primi hujus.*
28 30	4771588.
14 15	2461533.
36 45	5983246.
& complementa,	*& ſinus per 8 primi hujus.*
61 30	8788111.
75 45	9692309.
53 15	8012538.
& ſemiſſis peripheriæ 61,30,	*& ſinus ejus per 12 vel 13 primi hujus.*
30 45	5112931.
hujúſque complementum,	*& ſinus per 8 primi hujus.*
59 15	8594064.

His verò ſinibus inventis aſſumendum quoque eſt complementum arcus partium 12, nempe 78; & inde ſimili inductione ſemiſſium peripheriarum, complementorúm que ſinus continuè inveſtigandi ſunt. Quæ ratio ſi nõ modò in hujus peripheriæ ſinu, ſed & reliquis ſupra inventis ſervetur, tandē maxima pars Canonis abſolvetur.

Cæterum cùm ad Canonem complendum etiam prioris ſcrupuli & ſequentium aliquot ſinus deſiderentur, ſupereſt ut quemodo ex hujus Theorematis methodo, & ii inve-

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inveſtigandi ſint, paucis oſtendamus. Aſſumatur igitur ſinus partium 0, 45′ *ſupra inventus* 130896: *adhibitáque inductione ſuperiori hujus ſemiſſes continuè inveſtigentur per* 12 *vel* 13 *primi Triangul. Ita ſequentiũ peripheriarũ ſinus invenientur.*

22′	30′	65449
11	15	32724 ½

Porro cùm ex his ſinibus appareat eò uſque perveniſſe nos, ubi rectæ & curvæ differentia ſenſum prorſus evadit, tanquam una linea factarum, nullus error committetur, ſi æqua ratione reliquis peripheriis 22′ 30′ *minoribus ſinus rectus ejus* 65449 *accommodetur. Ita enim ſinus ſcrupuli unius dabitur* 2909 *fere, & ſcrupulorum* 15′, 43632; *& ita deinceps. Ex his verò ſinibus ſinuum Canon perficietur. Si duplorum arcuum & complementorum ſinus per decimam tertiam primi Triangulorum inveſtigentur: & ex iis rurſus ſemiſſium complementorúmque continuè; dum totus ſinuum Canon abſolutus fuerit.*

Hæc eſt ſinuum Canonis condendi ratio, quæ cùm ex ſuperioris libri elementis deducta ſit, ampliori demonſtratione non eſt opus.

12. Ductis vero ſingulis totius quadrantis ſinibus in radium, planiſque ſigillatim in ſinus complementorum diviſis, dantur ſingulæ totius circuli quadrantis peripheriarum tangentes, totuſque tangentium Canon hac methodo completur.

Hujus elementi ratio ex decimaſexta primi hujus manifeſta eſt. Nam per eandem Tangens peripheriæ ſe habet ad radium; ut peripheriæ ſinus rectus ad ſinum complementi. Itaque cum ſinuum Canon ex ſuperiori doctrina compoſitus ſit, componetur etiam tangentium Canon: multiplicatis ſingulis totius quadrantis ſinibus in radium, planiſque horum ſigillatim in complementorum ſuorum ſinus diviſis. Exempli gratia, datur ſinus partium 30, 5000000, *& complementi ſui* 8660254: *ergo tangens partium* 30 *erit* 5773502. *Nam ut* 8660254 *ad* 5000000; *ita* 10000000 *ſe habet ad* 5773502.

13. Secantium Canon componitur, radii quadrato in ſingulos totius circuli quadrantis ſinus diviſo, initio à ſinuum Canonis fine facto.

Nam per vigeſimam primi hujus, Radius media proportione eſt ad peripheriæ ſinum rectum, & ſecantem complementi. Itaque aſſumptis ſingulis totius quadrantis ſinibus à fine Canonis, diviſiſque iis in radii quadratum; dantur totius quadrantis ſecantes: & proinde earum Canon hac viâ completur. In exemplo ſuperiori, datur partium 30 *ſinus rectus* 5000000, *& quadratum radii* 10000000000000: *ergo ſecans partium* 60 *aſſumptæ ſcilicet peripheriæ complementi eſt* 20000000. *Nam ut* 5000000 *ad* 10000000; *ita* 10000000 *ad* 20000000.

Atque

Atque hæc quidem methodus eſt Conſtructionis Canonis Sinuum, Tangentium & Secantium, in quâ tamen ſponte à nobis omiſſa ſunt compendia ſuperioris libri Theorematibus 9, 21 & 22 demonſtrata. Nam cùm integer Triangulorum Canon ad manum eſſet, Sinuum quidem à præſtantiſſimo Mathematico Ioanne Regiomontano, Tangentium ab Eraſmo Reinholdo, Secantium verò ab Ioachimo Rhetico compoſitus, Latus iſta perſequi ſupervacuum duximus. Sufficit enim demonſtraſſe ex quibus fundamentis Canonis Triangul. conſtructio deducta, & qua methodo à præſtantiſſimis artificibus completus ſit. Reliquus eſt Canonis uſus quem ſequenti theoremate proponimus.

14. Canon Triangulorum in fronte partes circuli quadrantis, in ſiniſtro margine, partium ſcrupula prima, in communi interſectione, partis ſcrupulique ſinus, tangentes vel ſecantes, cum differentia 60 ſcrupulis ſecundis competente complectitur.

Canonis frons, vulgo tabulæ caput, ſuprema pars, aut tranſverſalis margo appellatur: continetque totius circuli quadrantis partes. Siniſter margo eſt in quo partium ſcrupula prima deſcripta ſunt. Communis interſectio, vel angulus eſt, in quo deſcendens & tranſverſalis ordo ſe mutuò interſecant. Differentia verò 60 ſecundis ſcrupulis competens, eſt exceſſus minoris ſinus, tangentis vel ſecantis, ſuper proximè majorem.

ΠΟΡΙΣΜΑΤΑ *duo.*

Itaque aſſumptæ partis, & primi ſcrupuli ſinus, tangens, vel ſecans in Canone eſt, quæ in angulo communi partis aſſumptæ, & ſcrupuli primi continetur: & contra.

In exemplo, ſinus partium 23 & ſcrupulorum primorum 28 eſt 3982155: Talis enim in angulo communi ſinuum canonis exhibetur. Viceverſa 3982155 ſinus eſt partium 2328: Inventus enim ſinus in Canone, partes 23 in fronte, ſcrupula verò prima 28 oſtendit.

Parti vero & ſcrupulis primis, etiam ſecundis adhærentibus pars proportionalis differentiæ (quæ Lx ſcrupulis ſecundis competit) ſinui, tangenti, vel ſecanti proximè minori addita, aſſumptæ peripheriæ ſinum, tangentem, vel ſecantem componit; & contra.

Exempli gratiâ ſinus partium 23, ſcrup. pr. 28, ſcrup. ſec. 30, eſt 3983489.

Nam

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Nam proximè minor ſinus in Canone invenitur, 3982155; *& differentia ſcrupulis* 60 *ſecundis competens eſt* 2668: *ergo proportionalis pars* 30 *ſecundis tribuenda eſt* 1334 *(Nam per auream regulam, ut* 60 *ad* 2668; *ita* 30 *ad* 1334) *hæc autem ſinui minori* 3982155 *adjecta componit* 3983489, *ſinum peripheriæ* 23-28-30 *quæſitum. Viceverſa peripheria ſinus* 3983489, *ex ſinuum Canone invenitur partium* 23-28-30. *Nam ſinus proximè minor* 3982155, *competit arcui partium* 23-28. *Differentia verò hujus ſinus & præcedentis dati eſt* 1334 : *cui congruunt* 30 *ſcrupula ſecunda, (Nam ut* 2668 *differentia ſexaginta ſcrupulis ſecundis competens, ad ſcrupula* 60 *ſecunda: ita* 1334 *ad* 30 *ſcrupula ſecunda) Itaque his ad arcum* 23-28 *proximè minorem adjectis, componitur peripheria partium* 23-28-30, *ſinui propoſito* 3983489, *correſpondens. Et hic quidem Canonis uſus. Iam ipſum Canonem ſubjicimus.*

o	Sinus		Tangens		Secans		
0	0	100000.00	0	Infinitum.	100000.00	Infinitum.	60
1	29.09	99999.99	29.09	343774667.38	100000.00	343774681.93	59
2	58.18	99999.98	58.18	171887319.15	100000.02	171887348.24	58
3	87.27	99999.96	87.27	114591529.94	100000.04	114591573.57	57
4	116.36	99999.93	116.36	85943630.48	100000.07	85943688.66	56
5	145.44	99999.89	145.44	68754886.93	100000.11	68754959.66	55
6	174.53	99999.84	174.53	57295721.34	100000.16	57295808.60	54
7	203.62	99999.79	203.62	49110600.28	100000.21	49110702.09	53
8	232.71	99999.73	232.71	42971757.06	100000.27	42971873.42	52
9	261.80	99999.66	261.80	38197099.08	100000.34	38197229.98	51
10	290.89	99999.58	290.89	34377370.74	100000.42	34377516.19	50
11	319.98	99999.49	319.98	31252136.71	100000.51	31252296.70	49
12	349.06	99999.39	349.07	28647773.40	100000.61	28647947.93	48
13	378.15	99999.28	378.16	26444079.88	100000.72	26444268.95	47
14	407.24	99999.17	407.25	24555198.33	100000.83	24555401.95	46
15	436.33	99999.05	436.33	22918166.36	100000.95	22918384.53	45
16	465.42	99998.92	465.42	21485762.18	100001.08	21485994.89	44
17	494.51	99998.78	494.51	20221874.99	100001.22	20222122.25	43
18	523.60	99998.63	523.60	19098418.64	100001.37	19098680.44	42
19	552.68	99998.47	552.69	18093219.83	100001.53	18093496.17	41
20	581.77	99998.30	581.78	17188539.93	100001.70	17188830.82	40
21	610.86	99998.13	610.87	16370019.10	100001.87	16370324.53	39
22	639.95	99997.95	639.96	15625908.37	100002.05	15626228.34	38
23	669.04	99997.76	669.05	14946502.08	100002.24	14946836.60	37
24	698.13	99997.56	698.14	14323712.17	100002.44	14324061.23	36
25	727.21	99997.35	727.23	13750744.68	100002.65	13751108.29	35
26	756.30	99997.13	756.32	13221850.86	100002.86	13222229.02	34
27	785.39	99996.91	785.41	12732133.65	100003.08	12732526.35	33
28	814.48	99996.68	814.50	12277395.54	100003.31	12277802.79	32
29	843.57	99996.44	843.60	11854018.02	100003.55	11854439.81	31
30	872.65	99996.19	872.69	11458865.01	100003.80	11459301.35	30

o	Sinus		Tangens		Secans		
30	872.65	99996.19	872.69	11458865.01	100003.80	11459301.35	30
31	901.74	99995.93	901.78	11089205.13	100004.06	11089656.01	29
32	930.83	99995.66	930.87	10742648.38	100004.33	10743113.80	28
33	959.92	99995.39	959.96	10417094.48	100004.61	10417574.45	27
34	989.00	99995.11	989.05	10110690.24	100004.89	10111184.75	26
35	1018.09	99994.82	1018.14	9821794.26	100005.18	9822303.32	25
36	1047.18	99994.52	1047.24	9548947.52	100005.48	9549471.12	24
37	1076.27	99994.21	1076.33	9290848.72	100005.79	9291386.87	23
38	1105.35	99993.89	1105.42	9046333.57	100006.11	9046886.26	22
39	1134.44	99993.56	1134.51	8814357.15	100006.44	8814924.39	21
40	1163.53	99993.23	1163.61	8593979.07	100006.77	8594560.86	20
41	1192.61	99992.89	1192.70	8384350.67	100007.11	8384947.00	19
42	1221.70	99992.54	1221.79	8184704.11	100007.46	8185314.98	18
43	1250.79	99992.18	1250.88	7994342.99	100007.82	7994968.41	17
44	1279.87	99991.81	1279.98	7812634.20	100008.19	7813274.16	16
45	1308.96	99991.43	1309.07	7639000.93	100008.57	7639655.44	15
46	1338.05	99991.04	1338.17	7472916.51	100008.96	7473585.56	14
47	1367.13	99990.65	1367.26	7313899.10	100009.35	7314582.70	13
48	1396.22	99990.25	1396.35	7161507.01	100009.75	7162205.15	12
49	1425.30	99989.84	1425.45	7015334.61	100010.16	7016047.35	11
50	1454.39	99989.42	1454.54	6875008.82	100010.58	6875735.95	10
51	1483.48	99988.99	1483.64	6740185.43	100011.01	6740927.20	9
52	1512.56	99988.55	1512.73	6610547.27	100011.45	6611303.59	8
53	1541.65	99988.11	1541.83	6485800.75	100011.89	6486571.62	7
54	1570.73	99987.66	1570.93	6365674.12	100012.34	6366459.53	6
55	1599.82	99987.20	1600.02	6249915.37	100012.80	6250715.33	5
56	1628.90	99986.73	1629.12	6138290.52	100013.27	6139105.02	4
57	1657.99	99986.25	1658.21	6030581.99	100013.75	6031411.04	3
58	1687.07	99985.76	1687.31	5926587.21	100014.24	5927430.81	2
59	1716.16	99985.27	1716.41	5826117.35	100014.73	5826975.49	1
60	1745.24	99984.77	1745.51	5728996.16	100015.23	5729868.85	0

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1	Sinus		Tangens		Secans		
0	1745.24	99984.77	1745.51	5728996.16	100015.23	5729868.85	60
1	1774.32	99984.26	1774.60	5635058.96	100015.74	5635946.19	59
2	1803.41	99983.74	1803.70	5544151.67	100016.26	5545053.45	58
3	1832.49	99983.21	1832.80	5456130.03	100016.79	5457046.35	57
4	1861.58	99982.67	1861.90	5370858.75	100017.33	5371789.62	56
5	1890.66	99982.12	1891.00	5288210.91	100017.88	5289156.37	55
6	1919.74	99981.57	1920.10	5208067.26	100018.43	5209027.22	54
7	1948.83	99981.01	1949.20	5130315.66	100018.99	5131290.17	53
8	1977.91	99980.44	1978.30	5054850.59	100019.56	5055839.65	52
9	2006.99	99979.86	2007.40	4981572.64	100020.14	4982576.23	51
10	2036.08	99979.27	2036.50	4910388.06	100020.73	4911406.20	50
11	2065.16	99978.67	2065.60	4841208.41	100021.33	4842241.10	49
12	2094.24	99978.06	2094.70	4773950.14	100021.94	4774997.38	48
13	2123.32	99977.45	2123.80	4708534.30	100022.55	4709596.08	47
14	2152.41	99976.83	2152.91	4644886.20	100023.17	4645962.53	46
15	2181.49	99976.20	2182.01	4582935.12	100023.80	4584025.99	45
16	2210.57	99975.56	2211.11	4522614.07	100024.44	4523719.49	44
17	2239.65	99974.91	2240.21	4463859.56	100025.09	4464979.52	43
18	2268.73	99974.25	2269.32	4406611.32	100025.75	4407745.83	42
19	2297.81	99973.59	2298.42	4350812.16	100026.41	4351961.22	41
20	2326.90	99972.92	2327.53	4296407.73	100027.08	4297571.34	40
21	2355.98	99972.24	2356.63	4243346.39	100027.76	4244524.54	39
22	2385.06	99971.55	2385.74	4191578.99	100028.45	4192771.68	38
23	2414.14	99970.85	2414.84	4141058.76	100029.15	4142266.00	37
24	2443.22	99970.14	2443.95	4091741.16	100029.86	4092962.95	36
25	2472.30	99969.43	2473.05	4043583.75	100030.58	4044820.09	35
26	2501.38	99968.71	2502.16	3996546.05	100031.30	3997796.94	34
27	2530.46	99967.98	2531.27	3950589.46	100032.03	3951854.89	33
28	2559.54	99967.24	2560.38	3905677.11	100032.77	3906957.09	32
29	2588.62	99966.49	2589.48	3861773.81	100033.52	3863068.34	31
30	2617.69	99965.73	2618.59	3818845.93	100034.28	3820155.00	30
							88

1	Sinus		Tangens		Secans		
30	2617.69	99965.73	2618.59	3818845.93	100034.28	3820155.00	30
31	2646.77	99964.96	2647.70	3776861.30	100035.05	3778184.92	29
32	2675.85	99964.19	2676.81	3735789.17	100035.82	3737127.34	28
33	2704.93	99963.41	2705.92	3695600.11	100036.60	3696952.82	27
34	2734.01	99962.62	2735.03	3656265.92	100037.39	3657633.18	26
35	2763.09	99961.82	2764.14	3617759.62	100038.19	3619141.43	25
36	2792.16	99961.01	2793.25	3580055.33	100039.00	3581451.68	24
37	2821.24	99960.19	2822.36	3543128.25	100039.82	3544539.15	23
38	2850.32	99959.36	2851.48	3506954.58	100040.65	3508380.03	22
39	2879.40	99958.53	2880.59	3471511.50	100041.48	3472951.50	21
40	2908.47	99957.69	2909.70	3436777.09	100042.32	3438231.63	20
41	2937.55	99956.84	2938.82	3402730.29	100043.17	3404199.39	19
42	2966.62	99955.98	2967.93	3369350.89	100044.03	3370834.53	18
43	2995.70	99955.11	2997.05	3336619.45	100044.90	3338117.63	17
44	3024.78	99954.24	3026.16	3304517.27	100045.78	3306030.00	16
45	3053.85	99953.36	3055.28	3273026.37	100046.67	3274553.65	15
46	3082.93	99952.47	3084.39	3242129.46	100047.56	3243671.29	14
47	3112.00	99951.57	3113.51	3211809.88	100048.46	3213366.26	13
48	3141.08	99950.66	3142.63	3182051.60	100049.37	3183622.52	12
49	3170.15	99949.74	3171.74	3152839.16	100050.29	3154424.63	11
50	3199.22	99948.81	3200.86	3124157.67	100051.22	3125757.70	10
51	3228.30	99947.88	3229.98	3095992.80	100052.15	3097607.37	9
52	3257.37	99946.94	3259.10	3068330.70	100053.09	3069959.82	8
53	3286.44	99945.99	3288.22	3041158.02	100054.05	3042801.69	7
54	3315.52	99945.03	3317.34	3014461.89	100055.01	3016120.10	6
55	3344.59	99944.06	3346.46	2988229.86	100055.98	2989902.63	5
56	3373.66	99943.08	3375.58	2962449.95	100056.96	2964137.26	4
57	3402.73	99942.09	3404.71	2937110.55	100057.95	2938812.41	3
58	3431.81	99941.09	3433.83	2912200.47	100058.94	2913916.88	2
59	3460.88	99940.09	3462.95	2887708.88	100059.94	2889439.84	1
60	3489.95	99939.08	3492.08	2863625.33	100060.95	2865370.83	0

BIBLIOTECA NAZ. ROMA VITTORIO EMANUELE

2	Sinus		Tangens		Secans		
0	3489.95	99939.08	3492.08	2863625.33	100060.95	2865370.83	60
1	3519.02	99938.06	3521.20	2839939.69	100061.97	2841699.74	59
2	3548.09	99937.03	3550.33	2816642.18	100063.00	2818416.78	58
3	3577.16	99935.99	3579.45	2793723.33	100064.04	2795512.48	57
4	3606.23	99934.95	3608.58	2771173.99	100065.09	2772977.69	56
5	3635.30	99933.90	3637.71	2748985.28	100066.15	2750803.53	55
6	3664.37	99932.84	3666.83	2727148.61	100067.21	2728981.41	54
7	3693.44	99931.77	3695.96	2705655.68	100068.28	2707503.03	53
8	3722.51	99930.69	3725.09	2684498.43	100069.36	2686360.33	52
9	3751.58	99929.60	3754.22	2663669.04	100070.45	2665545.49	51
10	3780.65	99928.51	3783.35	2643159.96	100071.55	2645050.96	50
11	3809.71	99927.40	3812.48	2622963.84	100072.66	2624869.39	49
12	3838.78	99926.29	3841.61	2603073.58	100073.77	2604993.68	48
13	3867.85	99925.17	3870.74	2583482.27	100074.89	2585416.92	47
14	3896.91	99924.04	3899.88	2564183.23	100076.02	2566132.43	46
15	3925.98	99922.90	3929.01	2545169.96	100077.16	2547133.71	45
16	3955.05	99921.75	3958.14	2526436.15	100078.31	2528414.45	44
17	3984.11	99920.60	3987.28	2507975.68	100079.47	2509968.53	43
18	4013.18	99919.44	4016.41	2489782.62	100080.63	2491790.02	42
19	4042.24	99918.27	4045.55	2471851.19	100081.80	2473873.14	41
20	4071.31	99917.09	4074.69	2454175.78	100082.98	2456212.28	40
21	4100.37	99915.90	4103.83	2436750.95	100084.17	2438802.00	39
22	4129.44	99914.70	4132.96	2419571.40	100085.37	2421637.00	38
23	4158.50	99913.49	4162.10	2402631.99	100086.58	2404712.14	37
24	4187.57	99912.28	4191.24	2385927.72	100087.80	2388022.42	36
25	4216.63	99911.06	4220.38	2369453.72	100089.02	2371562.97	35
26	4245.69	99909.83	4249.52	2353205.25	100090.25	2355329.05	34
27	4274.75	99908.59	4278.66	2337177.72	100091.49	2339316.07	33
28	4303.82	99907.34	4307.81	2321366.65	100092.74	2323519.55	32
29	4332.88	99906.08	4336.95	2305767.67	100094.00	2307935.13	31
30	4361.94	99904.82	4366.09	2290376.55	100095.27	2292558.56	30

2	Sinus		Tangens		Secans		
30	4361.94	99904.82	4366.09	2290376.55	100095.27	2292558.56	30
31	4391.00	99903.55	4395.24	2275189.16	100096.55	2277385.72	29
32	4420.06	99902.27	4424.38	2260201.48	100097.83	2262412.59	28
33	4449.12	99900.98	4453.53	2245409.59	100099.12	2247635.25	27
34	4478.18	99899.68	4482.68	2230809.67	100100.42	2233049.89	26
35	4507.24	99898.37	4511.82	2216398.02	100101.73	2218652.78	25
36	4536.30	99897.05	4540.97	2202171.00	100103.05	2204440.32	24
37	4565.36	99895.73	4570.12	2188125.10	100104.38	2190408.97	23
38	4594.42	99894.40	4599.27	2174256.87	100105.71	2176555.29	22
39	4623.47	99893.06	4628.42	2160562.96	100107.05	2162875.93	21
40	4652.53	99891.71	4657.57	2147040.10	100108.40	2149367.63	20
41	4681.59	99890.35	4686.73	2133685.11	100109.76	2136027.19	19
42	4710.64	99888.98	4715.88	2120494.88	100111.13	2122851.51	18
43	4739.70	99887.61	4745.03	2107466.37	100112.51	2109837.55	17
44	4768.76	99886.23	4774.19	2094596.63	100113.90	2096982.36	16
45	4797.81	99884.84	4803.34	2081882.76	100115.30	2084283.05	15
46	4826.87	99883.44	4832.50	2069321.96	100116.70	2071736.80	14
47	4855.92	99882.03	4861.66	2056911.47	100118.11	2059340.86	13
48	4884.98	99880.61	4890.82	2044648.61	100119.53	2047092.55	12
49	4914.03	99879.18	4919.97	2032530.75	100120.96	2034989.25	11
50	4943.08	99877.75	4949.13	2020555.35	100122.40	2023028.40	10
51	4972.14	99876.31	4978.29	2008719.89	100123.85	2011207.50	9
52	5001.19	99874.86	5007.46	1997021.95	100125.30	1999524.11	8
53	5030.24	99873.40	5036.62	1985459.12	100126.76	1987975.84	7
54	5059.29	99871.93	5065.78	1974029.10	100128.23	1976560.36	6
55	5088.35	99870.45	5094.95	1962729.59	100129.71	1965275.41	5
56	5117.40	99868.97	5124.11	1951558.37	100131.20	1954118.74	4
57	5146.45	99867.48	5153.28	1940513.27	100132.70	1943088.20	3
58	5175.50	99865.98	5182.44	1929592.17	100134.20	1932181.65	2
59	5204.55	99864.47	5211.61	1918792.98	100135.71	1921397.01	1
60	5233.60	99862.95	5240.78	1908113.67	100137.23	1910732.26	0

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3	Sinus		Tangens		Secans		
0	5233.60	99862.95	5240.78	1908113.67	100137.23	1910732.26	60
1	5262.64	99861.42	5269.95	1897552.26	100138.76	1900185.40	59
2	5291.69	99859.89	5299.12	1887106.80	100140.30	1889754.50	58
3	5320.74	99858.35	5328.29	1876775.39	100141.85	1879437.65	57
4	5349.79	99856.80	5357.46	1866556.18	100143.41	1869232.99	56
5	5378.83	99855.24	5386.63	1856447.34	100144.98	1859138.71	55
6	5407.88	99853.67	5415.81	1846447.09	100146.55	1849153.01	54
7	5436.93	99852.09	5444.98	1836553.70	100148.13	1839274.17	53
8	5465.97	99850.50	5474.16	1826765.44	100149.72	1829500.48	52
9	5495.02	99848.91	5503.33	1817080.67	100151.32	1819830.26	51
10	5524.06	99847.31	5532.51	1807497.74	100152.93	1810261.88	50
11	5553.11	99845.70	5561.69	1798015.05	100154.55	1800793.75	49
12	5582.15	99844.08	5590.87	1788631.04	100156.17	1791424.29	48
13	5611.19	99842.45	5620.05	1779344.17	100157.80	1782151.98	47
14	5640.24	99840.81	5649.23	1770152.94	100159.44	1772975.31	46
15	5669.28	99839.16	5678.41	1761055.88	100161.09	1763892.80	45
16	5698.32	99837.51	5707.59	1752051.55	100162.75	1754903.03	44
17	5727.36	99835.85	5736.78	1743138.54	100164.42	1746004.57	43
18	5756.40	99834.18	5765.96	1734315.46	100166.10	1737196.05	42
19	5785.44	99832.50	5795.15	1725580.95	100167.78	1728476.10	41
20	5814.48	99830.81	5824.34	1716933.69	100169.47	1719843.40	40
21	5843.52	99829.11	5853.52	1708372.38	100171.17	1711296.64	39
22	5872.56	99827.41	5882.71	1699895.74	100172.88	1702834.56	38
23	5901.60	99825.70	5911.90	1691502.51	100174.60	1694455.89	37
24	5930.64	99823.98	5941.09	1683191.48	100176.33	1686159.41	36
25	5959.67	99822.25	5970.29	1674961.44	100178.07	1677943.92	35
26	5988.71	99820.51	5999.48	1666811.20	100179.81	1669808.25	34
27	6017.75	99818.76	6028.67	1658739.62	100181.56	1661751.22	33
28	6046.78	99817.01	6057.87	1650745.55	100183.32	1653771.71	32
29	6075.82	99815.25	6087.06	1642827.89	100185.09	1645868.61	31
30	6104.85	99813.48	6116.26	1634985.55	100186.87	1638040.82	30

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3	Sinus		Tangens		Secans		
30	6104.85	99813.48	6116.26	1634985.55	100186.87	1638040.82	30
31	6133.89	99811.70	6145.46	1627217.44	100188.66	1630287.28	29
32	6162.92	99809.91	6174.66	1619522.53	100190.46	1622606.93	28
33	6191.96	99808.11	6203.86	1611899.79	100192.26	1614998.74	27
34	6220.99	99806.30	6233.06	1604348.19	100194.07	1607461.70	26
35	6250.02	99804.49	6262.26	1596866.74	100195.89	1599994.81	25
36	6279.05	99802.67	6291.47	1589454.48	100197.72	1592597.11	24
37	6308.08	99800.84	6320.67	1582110.45	100199.56	1585267.64	23
38	6337.11	99799.00	6349.88	1574833.71	100201.41	1578005.45	22
39	6366.14	99797.15	6379.08	1567623.33	100203.26	1570809.63	21
40	6395.17	99795.29	6408.29	1560478.41	100205.12	1563679.27	20
41	6424.20	99793.43	6437.50	1553398.06	100206.99	1556613.48	19
42	6453.23	99791.56	6466.71	1546381.41	100208.87	1549611.39	18
43	6482.26	99789.68	6495.92	1539427.60	100210.76	1542672.15	17
44	6511.29	99787.79	6525.13	1532535.80	100212.66	1535794.90	16
45	6540.31	99785.89	6554.35	1525705.17	100214.57	1528978.83	15
46	6569.34	99783.98	6583.56	1518934.90	100216.49	1522223.12	14
47	6598.36	99782.06	6612.78	1512224.20	100218.41	1515526.98	13
48	6627.39	99780.14	6641.99	1505572.27	100220.34	1508889.61	12
49	6656.41	99778.21	6671.21	1498978.36	100222.28	1502310.26	11
50	6685.44	99776.27	6700.43	1492441.70	100224.23	1495788.16	10
51	6714.46	99774.32	6729.65	1485961.55	100226.19	1489322.58	9
52	6743.48	99772.36	6758.87	1479537.18	100228.16	1482912.77	8
53	6772.51	99770.39	6788.09	1473167.87	100230.13	1476558.02	7
54	6801.53	99768.42	6817.32	1466852.92	100232.11	1470257.63	6
55	6830.55	99766.44	6846.54	1460591.63	100234.10	1464010.90	5
56	6859.57	99764.45	6875.77	1454383.32	100236.10	1457817.15	4
57	6888.59	99762.45	6904.99	1448227.32	100238.11	1451676.71	3
58	6917.61	99760.44	6934.22	1442122.97	100240.13	1445585.92	2
59	6946.63	99758.42	6963.45	1436069.61	100242.16	1439547.13	1
60	6975.65	99756.40	6992.68	1430066.63	100244.19	1433558.70	0

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4	Sinus		Tangens		Secans		
0	6975.65	99756.40	6992.68	1430066.63	100244.19	1433558.70	60
1	7004.66	99754.37	7021.91	1424113.37	100246.23	1427620.01	59
2	7033.68	99752.33	7051.15	1418209.24	100248.28	1421730.45	58
3	7062.70	99750.28	7080.38	1412353.63	100250.34	1415889.39	57
4	7091.71	99748.22	7109.61	1406545.93	100252.41	1410096.25	56
5	7120.73	99746.15	7138.85	1400785.56	100254.49	1404350.45	55
6	7149.74	99744.07	7168.09	1395071.94	100256.58	1398651.39	54
7	7178.76	99741.99	7197.33	1389404.51	100258.68	1392998.52	53
8	7207.77	99739.90	7226.57	1383782.70	100260.78	1387391.28	52
9	7236.78	99737.80	7255.81	1378205.98	100262.89	1381829.12	51
10	7265.80	99735.69	7285.05	1372673.79	100265.01	1376311.49	50
11	7294.81	99733.57	7314.30	1367185.60	100267.14	1370837.87	49
12	7323.82	99731.44	7343.54	1361740.89	100269.28	1365407.72	48
13	7352.83	99729.31	7372.79	1356339.15	100271.43	1360020.54	47
14	7381.84	99727.17	7402.03	1350979.86	100273.58	1354675.82	46
15	7410.85	99725.02	7431.28	1345662.53	100275.74	1349373.06	45
16	7439.86	99722.86	7460.53	1340386.67	100277.91	1344111.76	44
17	7468.87	99720.69	7489.79	1335151.79	100280.09	1338891.44	43
18	7497.87	99718.51	7519.04	1329957.41	100282.28	1333711.63	42
19	7526.88	99716.32	7548.29	1324803.07	100284.48	1328571.86	41
20	7555.89	99714.13	7577.55	1319688.30	100286.68	1323471.65	40
21	7584.89	99711.93	7606.80	1314612.66	100288.89	1318410.57	39
22	7613.90	99709.72	7636.06	1309575.68	100291.11	1313388.16	38
23	7642.90	99707.50	7665.32	1304576.93	100293.34	1308403.98	37
24	7671.90	99705.27	7694.58	1299615.98	100295.58	1303457.60	36
25	7700.91	99703.03	7723.84	1294692.40	100297.83	1298548.58	35
26	7729.91	99700.79	7753.11	1289805.77	100300.09	1293676.51	34
27	7758.91	99698.54	7782.37	1284955.66	100302.36	1288840.97	33
28	7787.91	99696.28	7811.64	1280141.68	100304.64	1284041.55	32
29	7816.91	99694.01	7840.90	1275363.41	100306.93	1279277.86	31
30	7845.91	99691.73	7870.17	1270620.47	100309.22	1274549.48	30

4	Sinus		Tangens		Secans		
30	7845.91	99691.73	7870.17	1270620.47	100309.22	1274549.48	30
31	7874.91	99689.44	7899.44	1265912.46	100311.52	1269856.04	29
32	7903.91	99687.15	7928.71	1261239.00	100313.83	1265197.15	28
33	7932.90	99684.85	7957.98	1256599.71	100316.15	1260572.42	27
34	7961.90	99682.54	7987.26	1251994.20	100318.48	1255981.48	26
35	7990.90	99680.22	8016.53	1247422.12	100320.81	1251423.97	25
36	8019.89	99677.89	8045.81	1242883.10	100323.15	1246899.52	24
37	8048.89	99675.55	8075.09	1238376.79	100325.50	1242407.77	23
38	8077.88	99673.20	8104.37	1233902.82	100327.86	1237948.37	22
39	8106.87	99670.85	8133.65	1229460.85	100330.23	1233520.97	21
40	8135.87	99668.49	8162.93	1225050.55	100332.61	1229125.23	20
41	8164.86	99666.12	8192.21	1220671.56	100335.00	1224760.82	19
42	8193.85	99663.74	8221.50	1216323.56	100337.40	1220427.39	18
43	8222.84	99661.35	8250.78	1212006.22	100339.80	1216124.62	17
44	8251.83	99658.95	8280.07	1207719.22	100342.21	1211852.18	16
45	8280.82	99656.55	8309.36	1203462.23	100344.63	1207609.76	15
46	8309.81	99654.14	8338.65	1199234.95	100347.06	1203397.05	14
47	8338.80	99651.72	8367.94	1195037.05	100349.50	1199213.72	13
48	8367.78	99649.29	8397.23	1190868.24	100351.95	1195059.48	12
49	8396.77	99646.85	8426.53	1186728.21	100354.41	1190934.02	11
50	8425.76	99644.40	8455.83	1182616.67	100356.87	1186837.05	10
51	8454.74	99641.94	8485.12	1178533.31	100359.34	1182768.27	9
52	8483.73	99639.48	8514.42	1174477.86	100361.82	1178727.39	8
53	8512.71	99637.01	8543.72	1170450.03	100364.31	1174714.12	7
54	8541.69	99634.53	8573.02	1166449.53	100366.81	1170728.19	6
55	8570.67	99632.04	8602.33	1162476.08	100369.32	1166769.32	5
56	8599.66	99629.54	8631.63	1158529.42	100371.84	1162837.23	4
57	8628.64	99627.03	8660.94	1154609.27	100374.36	1158931.65	3
58	8657.62	99624.52	8690.25	1150715.36	100376.89	1155052.31	2
59	8686.60	99622.00	8719.56	1146847.43	100379.43	1151198.96	1
60	8715.57	99619.47	8748.87	1143005.23	100381.98	1147371.32	0

5	Sinus		Tangens		Secans		
0	8715.57	99619.47	8748.87	1143005.23	100381.98	1147371.32	60
1	8744.55	99616.93	8778.18	1139188.49	100384.54	1143569.16	59
2	8773.53	99614.38	8807.49	1135396.96	100387.11	1139792.20	58
3	8802.51	99611.82	8836.81	1131630.40	100389.69	1136040.21	57
4	8831.48	99609.26	8866.12	1127888.55	100392.28	1132312.93	56
5	8860.46	99606.69	8895.44	1124171.17	100394.87	1128610.13	55
6	8889.43	99604.11	8924.76	1120478.03	100397.47	1124931.56	54
7	8918.40	99601.52	8954.08	1116808.88	100400.08	1121276.99	53
8	8947.38	99598.92	8983.41	1113163.50	100402.70	1117646.17	52
9	8976.35	99596.31	9012.73	1109541.64	100405.33	1114038.90	51
10	9005.32	99593.69	9042.06	1105943.10	100407.97	1110454.92	50
11	9034.29	99591.07	9071.38	1102367.63	100410.61	1106894.03	49
12	9063.26	99588.44	9100.71	1098815.01	100413.26	1103355.99	48
13	9092.23	99585.80	9130.04	1095285.04	100415.92	1099840.59	47
14	9121.19	99583.15	9159.38	1091777.49	100418.59	1096347.61	46
15	9150.16	99580.49	9188.71	1088292.14	100421.27	1092876.84	45
16	9179.13	99577.82	9218.04	1084828.80	100423.96	1089428.07	44
17	9208.09	99575.15	9247.38	1081387.24	100426.66	1086001.09	43
18	9237.06	99572.47	9276.72	1077967.27	100429.37	1082595.69	42
19	9266.02	99569.78	9306.06	1074568.68	100432.08	1079211.68	41
20	9294.99	99567.08	9335.40	1071191.26	100434.80	1075848.84	40
21	9323.95	99564.37	9364.74	1067834.84	100437.53	1072506.99	39
22	9352.91	99561.65	9394.09	1064499.19	100440.27	1069185.92	38
23	9381.87	99558.92	9423.44	1061184.14	100443.02	1065885.45	37
24	9410.83	99556.19	9452.78	1057889.50	100445.78	1062605.38	36
25	9439.79	99553.45	9482.13	1054615.07	100448.55	1059345.53	35
26	9468.75	99550.70	9511.48	1051360.67	100451.33	1056105.70	34
27	9497.71	99547.94	9540.84	1048126.11	100454.11	1052885.72	33
28	9526.66	99545.17	9570.19	1044911.22	100456.90	1049685.41	32
29	9555.62	99542.40	9599.55	1041715.81	100459.70	1046504.58	31
30	9584.58	99539.62	9628.90	1038539.71	100462.51	1043343.05	30

5	Sinus		Tangens		Secans		
30	9584.58	99539.62	9628.90	1038539.71	100462.51	1043343.05	30
31	9613.53	99536.83	9658.26	1035382.74	100465.33	1040200.66	29
32	9642.48	99534.03	9687.63	1032244.73	100468.16	1037077.23	28
33	9671.44	99531.22	9716.99	1029125.51	100470.99	1033972.59	27
34	9700.39	99528.40	9746.35	1026024.90	100473.83	1030886.56	26
35	9729.34	99525.57	9775.72	1022942.76	100476.68	1027818.99	25
36	9758.29	99522.74	9805.09	1019878.90	100479.54	1024769.71	24
37	9787.24	99519.90	9834.46	1016833.16	100482.41	1021738.55	23
38	9816.19	99517.05	9863.83	1013805.39	100485.29	1018725.36	22
39	9845.14	99514.19	9893.20	1010795.42	100488.18	1015729.98	21
40	9874.08	99511.32	9922.57	1007803.11	100491.08	1012752.24	20
41	9903.03	99508.44	9951.95	1004828.28	100493.99	1009792.00	19
42	9931.97	99505.55	9981.33	1001870.80	100496.90	1006849.09	18
43	9960.92	99502.66	10010.71	998930.50	100499.82	1003923.38	17
44	9989.86	99499.76	10040.09	996007.24	100502.75	1001014.70	16
45	10018.81	99496.85	10069.47	993100.88	100505.69	998122.91	15
46	10047.75	99493.93	10098.85	990211.25	100508.64	995247.87	14
47	10076.69	99491.00	10128.24	987338.23	100511.60	992389.43	13
48	10105.63	99488.06	10157.63	984481.66	100514.57	989547.44	12
49	10134.57	99485.12	10187.02	981641.40	100517.54	986721.76	11
50	10163.51	99482.17	10216.41	978817.32	100520.52	983912.27	10
51	10192.45	99479.21	10245.80	976009.27	100523.51	981118.80	9
52	10221.38	99476.24	10275.20	973217.13	100526.51	978341.24	8
53	10250.32	99473.26	10304.60	970440.75	100529.52	975579.44	7
54	10279.25	99470.27	10334.00	967680.00	100532.54	972833.27	6
55	10308.19	99467.28	10363.40	964934.75	100535.57	970102.60	5
56	10337.12	99464.28	10392.80	962204.86	100538.60	967387.30	4
57	10366.05	99461.27	10422.20	959490.22	100541.64	964687.24	3
58	10394.99	99458.25	10451.60	956790.68	100544.69	962002.29	2
59	10423.92	99455.22	10481.01	954106.13	100547.75	959332.33	1
60	10452.85	99452.18	10510.42	951436.45	100550.82	956677.22	0

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6	Sinus		Tangens		Secans		
0	10452.85	99452.18	10510.42	951436.45	100550.82	956677.22	60
1	10481.78	99449.14	10539.83	948781.49	100553.90	954036.86	59
2	10510.70	99446.09	10569.24	946141.16	100556.99	951411.10	58
3	10539.63	99443.03	10598.66	943515.31	100560.09	948799.84	57
4	10568.56	99439.96	10628.08	940903.84	100563.20	946202.96	56
5	10597.48	99436.88	10657.50	938306.63	100566.31	943620.33	55
6	10626.41	99433.79	10686.92	935723.55	100569.43	941051.84	54
7	10655.33	99430.69	10716.34	933154.50	100572.56	938497.38	53
8	10684.25	99427.59	10745.76	930599.36	100575.70	935956.82	52
9	10713.18	99424.48	10775.19	928058.02	100578.85	933430.06	51
10	10742.10	99421.36	10804.62	925530.35	100582.01	930916.99	50
11	10771.02	99418.23	10834.05	923016.27	100585.18	928417.49	49
12	10799.94	99415.09	10863.48	920515.64	100588.35	925931.45	48
13	10828.85	99411.94	10892.91	918028.38	100591.53	923458.77	47
14	10857.77	99408.79	10922.34	915554.36	100594.72	920999.34	46
15	10886.69	99405.63	10951.78	913093.48	100597.92	918553.05	45
16	10915.60	99402.46	10981.22	910645.64	100601.13	916119.80	44
17	10944.52	99399.28	11010.66	908210.74	100604.35	913699.49	43
18	10973.43	99396.09	11040.10	905788.67	100607.58	911292.00	42
19	11002.34	99392.89	11069.54	903379.33	100610.81	908897.25	41
20	11031.26	99389.69	11098.99	900982.61	100614.05	906515.12	40
21	11060.17	99386.48	11128.44	898598.43	100617.30	904145.53	39
22	11089.08	99383.26	11157.89	896226.68	100620.56	901788.37	38
23	11117.99	99380.03	11187.34	893867.26	100623.83	899443.54	37
24	11146.89	99376.79	11216.79	891520.08	100627.11	897110.95	36
25	11175.80	99373.54	11246.25	889185.05	100630.40	894790.51	35
26	11204.71	99370.28	11275.71	886862.06	100633.70	892482.11	34
27	11233.61	99367.02	11305.17	884551.03	100637.01	890185.67	33
28	11262.52	99363.75	11334.63	882251.86	100640.32	887901.09	32
29	11291.42	99360.47	11364.09	879964.46	100643.64	885628.28	31
30	11320.32	99357.18	11393.56	877688.74	100646.97	883367.15	30

6	Sinus		Tangens		Secans		
30	11320.32	99357.18	11393.56	877688.74	100646.97	883367.15	30
31	11349.22	99353.88	11423.03	875424.61	100650.31	881117.61	29
32	11378.12	99350.58	11452.50	873171.98	100653.66	878879.57	28
33	11407.02	99347.27	11481.97	870930.77	100657.02	876652.95	27
34	11435.92	99343.95	11511.44	868700.88	100660.39	874437.66	26
35	11464.82	99340.62	11540.91	866482.23	100663.77	872233.61	25
36	11493.71	99337.28	11570.39	864274.75	100667.15	870040.71	24
37	11522.61	99333.93	11599.87	862078.33	100670.54	867858.89	23
38	11551.51	99330.57	11629.35	859892.90	100673.94	865688.05	22
39	11580.40	99327.20	11658.83	857718.38	100677.35	863528.12	21
40	11609.29	99323.83	11688.31	855554.68	100680.77	861379.01	20
41	11638.18	99320.45	11717.80	853401.72	100684.20	859240.65	19
42	11667.07	99317.06	11747.29	851259.43	100687.64	857112.95	18
43	11695.96	99313.66	11776.78	849127.72	100691.08	854995.84	17
44	11724.85	99310.25	11806.28	847006.51	100694.53	852889.23	16
45	11753.74	99306.84	11835.78	844895.73	100697.99	850793.04	15
46	11782.63	99303.42	11865.28	842795.31	100701.46	848707.21	14
47	11811.51	99299.99	11894.78	840705.15	100704.94	846631.65	13
48	11840.40	99296.55	11924.28	838625.19	100708.43	844566.29	12
49	11869.28	99293.10	11953.78	836555.36	100711.93	842511.05	11
50	11898.16	99289.64	11983.28	834495.57	100715.44	840465.86	10
51	11927.04	99286.17	12012.79	832445.77	100718.96	838430.65	9
52	11955.93	99282.70	12042.30	830405.86	100722.48	836405.34	8
53	11984.81	99279.22	12071.81	828375.79	100726.01	834389.86	7
54	12013.68	99275.73	12101.32	826355.47	100729.55	832384.15	6
55	12042.56	99272.23	12130.84	824344.85	100733.10	830388.12	5
56	12071.44	99268.72	12160.36	822343.84	100736.66	828401.71	4
57	12100.31	99265.21	12189.88	820352.39	100740.23	826424.85	3
58	12129.19	99261.69	12219.40	818370.41	100743.81	824457.48	2
59	12158.06	99258.16	12248.93	816397.86	100747.40	822499.52	1
60	12186.93	99254.62	12278.46	814434.64	100750.99	820550.90	0

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7	Sinus		Tangens		Secans		
0	12186.93	99254.62	12278.46	814434.64	100750.99	820550.90	60
1	12215.81	99251.07	12307.99	812480.71	100754.59	818611.57	59
2	12244.68	99247.51	12337.52	810535.99	100758.20	816681.45	58
3	12273.55	99243.94	12367.05	808600.42	100761.82	814760.48	57
4	12302.41	99240.36	12396.58	806673.94	100765.45	812848.60	56
5	12331.28	99236.78	12426.12	804756.47	100769.09	810945.73	55
6	12360.15	99233.19	12455.66	802847.96	100772.74	809051.82	54
7	12389.01	99229.59	12485.20	800948.35	100776.39	807166.81	53
8	12417.88	99225.98	12514.74	799057.56	100780.05	805290.62	52
9	12446.74	99222.36	12544.29	797175.55	100783.72	803423.21	51
10	12475.60	99218.74	12573.84	795302.24	100787.40	801564.50	50
11	12504.46	99215.11	12603.39	793437.58	100791.09	799714.45	49
12	12533.32	99211.47	12632.94	791581.51	100794.79	797872.98	48
13	12562.18	99207.82	12662.49	789733.96	100798.50	796040.03	47
14	12591.04	99204.16	12692.05	787894.89	100802.22	794215.56	46
15	12619.90	99200.49	12721.61	786064.23	100805.95	792399.50	45
16	12648.75	99196.81	12751.17	784241.91	100809.69	790591.79	44
17	12677.61	99193.13	12780.73	782427.90	100813.43	788792.38	43
18	12706.46	99189.44	12810.29	780622.12	100817.18	787001.20	42
19	12735.31	99185.74	12839.86	778824.53	100820.94	785218.21	41
20	12764.16	99182.03	12869.43	777035.06	100824.71	783443.35	40
21	12793.01	99178.31	12899.00	775253.66	100828.49	781676.56	39
22	12821.86	99174.59	12928.57	773480.28	100832.28	779917.78	38
23	12850.71	99170.86	12958.15	771714.86	100836.07	778166.97	37
24	12879.56	99167.12	12987.73	769957.35	100839.88	776424.06	36
25	12908.41	99163.37	13017.31	768207.69	100843.70	774689.01	35
26	12937.25	99159.61	13046.89	766465.84	100847.52	772961.76	34
27	12966.09	99155.84	13076.48	764731.74	100851.35	771242.27	33
28	12994.94	99152.06	13106.07	763005.33	100855.19	769530.47	32
29	13023.78	99148.28	13135.66	761286.57	100859.04	767826.31	31
30	13052.62	99144.49	13165.25	759575.41	100862.90	766129.76	30

7	Sinus		Tangens		Secans		
30	13052.62	99144.49	13165.25	759575.41	100862.90	766129.76	30
31	13081.46	99140.69	13194.84	757871.79	100866.77	764440.75	29
32	13110.30	99136.88	13224.44	756175.67	100870.65	762759.23	28
33	13139.13	99133.06	13254.04	754486.99	100874.53	761085.16	27
34	13167.97	99129.23	13283.64	752805.71	100878.42	759418.49	26
35	13196.81	99125.39	13313.24	751131.78	100882.32	757759.16	25
36	13225.64	99121.55	13342.85	749465.14	100886.23	756107.13	24
37	13254.47	99117.70	13372.46	747805.76	100890.15	754462.36	23
38	13283.30	99113.84	13402.07	746153.57	100894.08	752824.78	22
39	13312.13	99109.97	13431.68	744508.55	100898.02	751194.37	21
40	13340.96	99106.09	13461.29	742870.64	100901.97	749571.06	20
41	13369.79	99102.21	13490.91	741239.78	100905.92	747954.82	19
42	13398.62	99098.32	13520.53	739615.95	100909.88	746345.60	18
43	13427.44	99094.42	13550.15	737999.09	100913.85	744743.35	17
44	13456.27	99090.51	13579.77	736389.16	100917.83	743148.03	16
45	13485.09	99086.59	13609.40	734786.10	100921.82	741559.59	15
46	13513.92	99082.66	13639.03	733189.89	100925.82	739977.98	14
47	13542.74	99078.72	13668.66	731600.47	100929.83	738403.18	13
48	13571.56	99074.78	13698.29	730017.80	100933.85	736835.12	12
49	13600.38	99070.83	13727.93	728441.84	100937.88	735273.77	11
50	13629.19	99066.87	13757.57	726872.55	100941.92	733719.09	10
51	13658.01	99062.90	13787.21	725309.87	100945.96	732171.02	9
52	13686.83	99058.92	13816.85	723753.78	100950.01	730629.54	8
53	13715.64	99054.93	13846.50	722204.22	100954.07	729094.60	7
54	13744.45	99050.94	13876.15	720661.16	100958.14	727566.16	6
55	13773.27	99046.94	13905.80	719124.56	100962.22	726044.17	5
56	13802.08	99042.93	13935.45	717594.37	100966.31	724528.59	4
57	13830.89	99038.91	13965.10	716070.56	100970.41	723019.40	3
58	13859.70	99034.88	13994.76	714553.08	100974.52	721516.53	2
59	13888.50	99030.84	14024.42	713041.90	100978.64	720019.96	1
60	13917.31	99026.80	14054.08	711536.97	100982.76	718529.65	0

8	Sinus		Tangens		Secans		
0	13917.31	99026.80	14054.08	711536.97	100982.76	718529.65	60
1	13946.12	99022.75	14083.74	710038.26	100986.89	717045.56	59
2	13974.92	99018.69	14113.41	708545.73	100991.03	715567.64	58
3	14003.72	99014.62	14143.08	707059.34	100995.18	714095.87	57
4	14032.52	99010.54	14172.75	705579.05	100999.34	712630.19	56
5	14061.32	99006.45	14202.43	704104.82	101003.51	711170.58	55
6	14090.12	99002.36	14232.11	702636.62	101007.69	709717.00	54
7	14118.92	98998.26	14261.79	701174.41	101011.88	708269.41	53
8	14147.72	98994.15	14291.47	699718.06	101016.07	706827.77	52
9	14176.51	98990.03	14321.15	698267.81	101020.27	705392.05	51
10	14205.31	98985.90	14350.84	696823.35	101024.48	703962.20	50
11	14234.10	98981.76	14380.53	695384.73	101028.70	702538.20	49
12	14262.89	98977.62	14410.22	693951.92	101032.93	701120.01	48
13	14291.68	98973.47	14439.91	692524.89	101037.17	699707.60	47
14	14320.47	98969.31	14469.61	691103.59	101041.42	698300.92	46
15	14349.26	98965.14	14499.31	689687.99	101045.68	696899.94	45
16	14378.05	98960.96	14529.01	688278.07	101049.95	695504.64	44
17	14406.84	98956.77	14558.71	686873.78	101054.23	694114.96	43
18	14435.62	98952.57	14588.42	685475.08	101058.51	692730.89	42
19	14464.40	98948.37	14618.13	684081.96	101062.80	691352.39	41
20	14493.19	98944.16	14647.84	682694.37	101067.10	689979.42	40
21	14521.97	98939.94	14677.55	681312.27	101071.41	688611.95	39
22	14550.75	98935.71	14707.27	679935.65	101075.73	687249.95	38
23	14579.53	98931.47	14736.99	678564.46	101080.06	685893.38	37
24	14608.30	98927.23	14766.71	677198.67	101084.40	684542.22	36
25	14637.08	98922.98	14796.44	675838.26	101088.75	683196.42	35
26	14665.85	98918.72	14826.17	674483.18	101093.11	681855.97	34
27	14694.63	98914.45	14855.90	673133.41	101097.47	680520.82	33
28	14723.40	98910.17	14885.63	671788.91	101101.84	679190.95	32
29	14752.17	98905.88	14915.36	670449.66	101106.22	677866.32	31
30	14780.94	98901.58	14945.10	669115.62	101110.61	676546.91	30

8	Sinus		Tangens		Secans		
30	14780.94	98901.58	14945.10	669115.62	101110.61	676546.91	30
31	14809.71	98897.28	14974.84	667786.77	101115.01	675232.68	29
32	14838.48	98892.97	15004.58	666463.07	101119.42	673923.60	28
33	14867.24	98888.65	15034.33	665144.49	101123.84	672619.65	27
34	14896.01	98884.32	15064.08	663831.00	101128.27	671320.79	26
35	14924.77	98879.98	15093.83	662522.58	101132.71	670026.99	25
36	14953.53	98875.63	15123.58	661219.19	101137.15	668738.22	24
37	14982.30	98871.28	15153.33	659920.80	101141.60	667454.46	23
38	15011.06	98866.92	15183.09	658627.39	101146.06	666175.68	22
39	15039.81	98862.55	15212.85	657338.92	101150.53	664901.84	21
40	15068.57	98858.17	15242.61	656055.38	101155.01	663632.93	20
41	15097.33	98853.78	15272.38	654776.72	101159.50	662368.90	19
42	15126.08	98849.38	15302.15	653502.93	101164.00	661109.73	18
43	15154.84	98844.98	15331.92	652233.96	101168.51	659855.40	17
44	15183.59	98840.57	15361.89	650969.81	101173.03	658605.87	16
45	15212.34	98836.15	15391.47	649710.43	101177.56	657361.12	15
46	15241.09	98831.72	15421.25	648455.81	101182.09	656121.13	14
47	15269.84	98827.28	15451.03	647205.91	101186.63	654885.86	13
48	15298.58	98822.83	15480.82	645960.70	101191.18	653655.28	12
49	15327.33	98818.38	15510.61	644720.17	101195.74	652429.38	11
50	15356.07	98813.92	15540.40	643484.28	101200.31	651208.12	10
51	15384.82	98809.45	15570.19	642253.01	101204.89	649991.48	9
52	15413.56	98804.97	15599.98	641026.33	101209.48	648779.44	8
53	15442.30	98800.48	15629.78	639804.22	101214.08	647571.95	7
54	15471.04	98795.98	15659.58	638586.65	101218.69	646369.01	6
55	15499.78	98791.48	15689.38	637373.59	101223.31	645170.59	5
56	15528.51	98786.97	15719.19	636165.02	101227.93	643976.66	4
57	15557.25	98782.45	15749.00	634960.92	101232.56	642787.19	3
58	15585.98	98777.92	15778.81	633761.26	101237.20	641602.16	2
59	15614.72	98773.38	15808.62	632566.01	101241.85	640421.54	1
60	15643.45	98768.83	15838.44	631375.15	101246.51	639245.32	0

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9	Sinus		Tangens		Secans		
0	15643.45	98768.83	15838.44	631375.15	101246.51	639245.32	60
1	15672.18	98764.28	15868.26	630188.66	101251.18	638073.47	59
2	15700.91	98759.72	15898.08	629006.51	101255.86	636905.95	58
3	15729.63	98755.15	15927.91	627828.68	101260.55	635742.76	57
4	15758.36	98750.57	15957.74	626655.14	101265.25	634583.86	56
5	15787.08	98745.98	15987.57	625485.88	101269.96	633429.23	55
6	15815.81	98741.38	16017.40	624320.86	101274.67	632278.84	54
7	15844.53	98736.77	16047.24	623160.07	101279.39	631132.69	53
8	15873.25	98732.16	16077.08	622003.47	101284.12	629990.73	52
9	15901.97	98727.54	16106.92	620851.06	101288.86	628852.95	51
10	15930.69	98722.91	16136.77	619702.79	101293.61	627719.33	50
11	15959.40	98718.27	16166.62	618558.67	101298.37	626589.84	49
12	15988.12	98713.62	16196.47	617418.65	101303.14	625464.46	48
13	16016.83	98708.97	16226.32	616282.72	101307.92	624343.16	47
14	16045.55	98704.31	16256.17	615150.85	101312.71	623225.94	46
15	16074.26	98699.64	16286.03	614023.03	101317.51	622112.76	45
16	16102.97	98694.96	16315.89	612899.23	101322.31	621003.59	44
17	16131.67	98690.27	16345.76	611779.43	101327.12	619898.43	43
18	16160.38	98685.57	16375.63	610663.60	101331.94	618797.25	42
19	16189.09	98680.86	16405.50	609551.74	101336.77	617700.03	41
20	16217.79	98676.15	16435.37	608443.81	101341.61	616606.74	40
21	16246.50	98671.43	16465.25	607339.79	101346.46	615517.36	39
22	16275.20	98666.70	16495.13	606239.67	101351.32	614431.89	38
23	16303.90	98661.96	16525.01	605143.43	101356.19	613350.28	37
24	16332.60	98657.21	16554.89	604051.03	101361.07	612272.53	36
25	16361.29	98652.46	16584.78	602962.47	101365.95	611198.61	35
26	16389.99	98647.70	16614.67	601877.72	101370.84	610128.50	34
27	16418.68	98642.93	16644.56	600796.76	101375.74	609062.19	33
28	16447.38	98638.15	16674.46	599719.57	101380.65	607999.64	32
29	16476.07	98633.36	16704.36	598646.14	101385.57	606940.85	31
30	16504.76	98628.56	16734.26	597576.44	101390.50	605885.80	30
							80

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9	Sinus		Tangens		Secans		
30	16504.76	98628.56	16734.26	597576.44	101390.50	605885.80	30
31	16533.45	98623.75	16764.16	596510.45	101395.44	604834.45	29
32	16562.14	98618.94	16794.07	595448.15	101400.39	603786.80	28
33	16590.82	98614.12	16823.98	594389.52	101405.35	602742.82	27
34	16619.51	98609.29	16853.89	593334.55	101410.32	601702.50	26
35	16648.19	98604.45	16883.81	592283.22	101415.30	600665.81	25
36	16676.87	98599.60	16913.73	591235.50	101420.29	599632.74	24
37	16705.55	98594.74	16943.65	590191.38	101425.29	598603.26	23
38	16734.23	98589.88	16973.58	589150.84	101430.29	597577.37	22
39	16762.91	98585.01	17003.51	588113.86	101435.30	596555.04	21
40	16791.59	98580.13	17033.44	587080.42	101440.32	595536.25	20
41	16820.26	98575.24	17063.37	586050.51	101445.35	594520.98	19
42	16848.94	98570.34	17093.31	585024.10	101450.39	593509.22	18
43	16877.61	98565.44	17123.25	584001.17	101455.44	592500.95	17
44	16906.28	98560.53	17153.19	582981.72	101460.50	591496.14	16
45	16934.95	98555.61	17183.14	581965.72	101465.57	590494.79	15
46	16963.62	98550.68	17213.09	580953.15	101470.64	589496.88	14
47	16992.28	98545.74	17243.04	579944.00	101475.72	588502.38	13
48	17020.95	98540.79	17273.00	578938.25	101480.81	587511.28	12
49	17049.61	98535.83	17302.96	577935.88	101485.91	586523.56	11
50	17078.28	98530.87	17332.92	576936.88	101491.02	585539.20	10
51	17106.94	98525.90	17362.88	575941.22	101496.14	584558.20	9
52	17135.60	98520.92	17392.85	574948.89	101501.27	583580.53	8
53	17164.25	98515.93	17422.82	573959.88	101506.41	582606.17	7
54	17192.91	98510.93	17452.79	572974.16	101511.56	581635.10	6
55	17221.56	98505.92	17482.77	571991.73	101516.72	580667.32	5
56	17250.22	98500.91	17512.75	571012.56	101521.89	579702.80	4
57	17278.87	98495.89	17542.73	570036.63	101527.07	578741.53	3
58	17307.52	98490.86	17572.72	569063.94	101532.26	577783.50	2
59	17336.17	98485.82	17602.71	568094.46	101537.46	576828.67	1
60	17364.82	98480.77	17632.70	567128.18	101542.67	575877.05	0

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10	Sinus		Tangens		Secans		
0	17364.82	98480.77	17632.70	567128.18	101542.67	575877.05	60
1	17393.46	98475.71	17662.69	566165.09	101547.88	574928.61	59
2	17422.11	98470.65	17692.69	565205.16	101553.10	573983.33	58
3	17450.75	98465.58	17722.69	564248.38	101558.33	573041.21	57
4	17479.39	98460.50	17752.69	563294.74	101563.57	572102.23	56
5	17508.03	98455.41	17782.70	562344.21	101568.82	571166.36	55
6	17536.67	98450.31	17812.71	561396.80	101574.08	570233.60	54
7	17565.31	98445.21	17842.72	560452.47	101579.35	569303.93	53
8	17593.95	98440.10	17872.74	559511.21	101584.63	568377.34	52
9	17622.58	98434.98	17902.76	558573.02	101589.92	567453.80	51
10	17651.21	98429.85	17932.78	557637.86	101595.21	566533.31	50
11	17679.84	98424.71	17962.81	556705.74	101600.51	565615.84	49
12	17708.47	98419.56	17992.84	555776.63	101605.82	564701.40	48
13	17737.10	98414.40	18022.87	554850.52	101611.14	563789.95	47
14	17765.73	98409.24	18052.91	553927.40	101616.47	562881.48	46
15	17794.35	98404.07	18082.95	553007.24	101621.81	561975.99	45
16	17822.98	98398.89	18112.99	552090.05	101627.16	561073.45	44
17	17851.60	98393.70	18143.03	551175.79	101632.52	560173.86	43
18	17880.22	98388.50	18173.08	550264.46	101637.89	559277.19	42
19	17908.84	98383.29	18203.13	549356.04	101643.27	558383.43	41
20	17937.46	98378.08	18233.18	548450.52	101648.66	557492.58	40
21	17966.07	98372.86	18263.24	547547.88	101654.06	556604.60	39
22	17994.69	98367.63	18293.30	546648.12	101659.46	555719.50	38
23	18023.30	98362.39	18323.36	545751.21	101664.87	554837.26	37
24	18051.91	98357.14	18353.43	544857.15	101670.29	553957.86	36
25	18080.52	98351.89	18383.50	543965.92	101675.72	553081.29	35
26	18109.13	98346.63	18413.57	543077.50	101681.16	552207.54	34
27	18137.74	98341.36	18443.65	542191.88	101686.61	551336.59	33
28	18166.35	98336.08	18473.73	541309.06	101692.07	550468.43	32
29	18194.95	98330.79	18503.81	540429.01	101697.54	549603.05	31
30	18223.55	98325.49	18533.90	539551.72	101703.02	548740.43	30

10	Sinus		Tangens		Secans		
30	18223.55	98325.49	18533.90	539551.72	101703.02	548740.43	30
31	18252.15	98320.18	18563.99	538677.18	101708.51	547880.55	29
32	18280.75	98314.87	18594.08	537805.38	101714.01	547023.42	28
33	18309.35	98309.55	18624.18	536936.30	101719.52	546169.01	27
34	18337.95	98304.22	18654.28	536069.93	101725.04	545317.31	26
35	18366.54	98298.88	18684.38	535206.26	101730.56	544468.31	25
36	18395.13	98293.53	18714.49	534345.27	101736.09	543621.99	24
37	18423.73	98288.17	18744.60	533486.96	101741.63	542778.35	23
38	18452.32	98282.81	18774.71	532631.31	101747.18	541937.37	22
39	18480.91	98277.44	18804.83	531778.30	101752.74	541099.03	21
40	18509.49	98272.06	18834.95	530927.93	101758.31	540263.33	20
41	18538.08	98266.67	18865.07	530080.18	101763.89	539430.26	19
42	18566.66	98261.27	18895.20	529235.05	101769.48	538599.79	18
43	18595.24	98255.87	18925.33	528392.51	101775.08	537771.92	17
44	18623.82	98250.46	18955.46	527552.55	101780.69	536946.64	16
45	18652.40	98245.04	18985.59	526715.17	101786.31	536123.93	15
46	18680.98	98239.61	19015.73	525880.35	101791.94	535303.79	14
47	18709.56	98234.17	19045.87	525048.09	101797.58	534486.20	13
48	18738.13	98228.72	19076.02	524218.36	101803.22	533671.14	12
49	18766.70	98223.27	19106.17	523391.16	101808.87	532858.61	11
50	18795.27	98217.81	19136.32	522566.47	101814.53	532048.60	10
51	18823.84	98212.34	19166.48	521744.28	101820.20	531241.09	9
52	18852.41	98206.86	19196.64	520924.59	101825.88	530436.08	8
53	18880.98	98201.37	19226.80	520107.38	101831.57	529633.54	7
54	18909.54	98195.87	19256.96	519292.64	101837.27	528833.47	6
55	18938.11	98190.36	19287.13	518480.35	101842.98	528035.87	5
56	18966.67	98184.85	19317.30	517670.51	101848.70	527240.70	4
57	18995.23	98179.33	19347.48	516863.11	101854.43	526447.98	3
58	19023.79	98173.80	19377.66	516058.13	101860.17	525657.68	2
59	19052.34	98168.26	19407.84	515255.57	101865.92	524869.79	1
60	19080.90	98162.71	19438.03	514455.40	101871.68	524084.31	0

11	Sinus		Tangens		Secans		
0	19080.90	98162.71	19438.03	5144554.0	101871.68	524084.31	60
1	19109.45	98157.16	19468.22	513657.63	101877.44	523301.21	59
2	19138.00	98151.60	19498.41	512862.24	101883.21	522520.50	58
3	19166.55	98146.03	19528.61	512069.21	101888.99	521742.16	57
4	19195.10	98140.45	19558.81	511278.55	101894.78	520966.18	56
5	19223.65	98134.86	19589.01	510490.24	101900.58	520192.54	55
6	19252.20	98129.26	19619.22	509704.26	101906.39	519421.25	54
7	19280.74	98123.66	19649.43	508920.61	101912.21	518652.28	53
8	19309.28	98118.05	19679.64	508139.28	101918.04	517885.63	52
9	19337.82	98112.43	19709.86	507360.25	101923.88	517121.28	51
10	19366.36	98106.80	19740.08	506583.52	101929.73	516359.24	50
11	19394.90	98101.16	19770.30	505809.07	101935.59	515599.48	49
12	19423.44	98095.51	19800.53	505036.90	101941.46	514841.99	48
13	19451.97	98089.86	19830.76	504267.00	101947.34	514086.77	47
14	19480.50	98084.20	19861.00	503499.35	101953.23	513333.81	46
15	19509.03	98078.53	19891.24	502733.95	101959.12	512583.09	45
16	19537.56	98072.85	19921.48	501970.78	101965.02	511834.61	44
17	19566.09	98067.16	19951.72	501209.84	101970.93	511088.35	43
18	19594.61	98061.46	19981.97	500451.11	101976.85	510344.31	42
19	19623.14	98055.76	20012.22	499694.59	101982.78	509602.48	41
20	19651.66	98050.05	20042.48	498940.27	101988.72	508862.84	40
21	19680.18	98044.33	20072.74	498188.13	101994.67	508125.39	39
22	19708.70	98038.60	20103.00	497438.17	102000.63	507390.12	38
23	19737.22	98032.86	20133.27	496690.37	102006.60	506657.01	37
24	19765.73	98027.11	20163.54	495944.74	102012.58	505926.06	36
25	19794.25	98021.36	20193.81	495201.25	102018.57	505197.26	35
26	19822.76	98015.60	20224.09	494459.90	102024.57	504470.60	34
27	19851.27	98009.85	20254.37	493720.68	102030.58	503746.07	33
28	19879.78	98004.05	20284.65	492983.58	102036.60	503023.67	32
29	19908.29	97998.26	20314.94	492248.59	102042.63	502303.37	31
30	19936.79	97992.47	20345.23	491515.70	102048.67	501585.17	30

11	Sinus		Tangens		Secans		
30	19936.79	97992.47	20345.23	491515.70	102048.67	501585.17	30
31	19965.30	97986.67	20375.52	490784.91	102054.71	500869.07	29
32	19993.80	97980.86	20405.82	490056.20	102060.76	500155.05	28
33	20022.30	97975.04	20436.12	489329.56	102066.82	499443.11	27
34	20050.80	97969.21	20466.43	488604.99	102072.89	498733.23	26
35	20079.30	97963.37	20496.74	487882.48	102078.97	498025.41	25
36	20107.79	97957.52	20527.05	487162.01	102085.06	497319.64	24
37	20136.29	97951.67	20557.37	486443.59	102091.16	496615.91	23
38	20164.78	97945.81	20587.69	485727.19	102097.27	495914.21	22
39	20193.27	97939.94	20618.01	485012.82	102103.39	495214.53	21
40	20221.76	97934.06	20648.34	484300.45	102109.52	494516.87	20
41	20250.24	97928.17	20678.67	483590.10	102115.66	493821.20	19
42	20278.73	97922.28	20709.00	482881.74	102121.81	493127.54	18
43	20307.21	97916.38	20739.34	482175.36	102127.97	492435.86	17
44	20335.69	97910.47	20769.68	481470.96	102134.14	491746.16	16
45	20364.17	97904.55	20800.03	480768.54	102140.32	491058.44	15
46	20392.65	97898.62	20830.38	480068.08	102146.50	490372.67	14
47	20421.13	97892.68	20860.73	479369.57	102152.69	489688.86	13
48	20449.61	97886.74	20891.09	478673.00	102158.89	489007.00	12
49	20478.08	97880.79	20921.45	477978.37	102165.10	488327.07	11
50	20506.55	97874.83	20951.81	477285.67	102171.32	487649.07	10
51	20535.02	97868.86	20982.18	476594.90	102177.55	486972.99	9
52	20563.49	97862.88	21012.55	475906.03	102183.79	486298.83	8
53	20591.95	97856.89	21042.93	475219.07	102190.04	485626.57	7
54	20620.42	97850.90	21073.31	474534.01	102196.30	484956.21	6
55	20648.88	97844.90	21103.69	473850.83	102202.57	484287.74	5
56	20677.34	97838.89	21134.07	473169.54	102208.85	483621.14	4
57	20705.80	97832.87	21164.46	472490.12	102215.14	482956.43	3
58	20734.26	97826.84	21194.85	471812.56	102221.44	482293.57	2
59	20762.71	97820.80	21225.25	471136.86	102227.75	481632.58	1
60	20791.17	97814.76	21255.65	470463.01	102234.07	480973.43	0

12'	Sinus		Tangens		Secans		
0	20791.17	97814.76	21255.65	470463.01	102234.07	480973.43	60
1	20819.62	97808.71	21286.06	469791.00	102240.40	480316.13	59
2	20848.07	97802.65	21316.47	469120.83	102246.73	479660.66	58
3	20876.52	97796.58	21346.88	468452.48	102253.07	479007.02	57
4	20904.97	97790.50	21377.30	467785.95	102259.42	478355.20	56
5	20933.41	97784.41	21407.72	467121.24	102265.78	477705.19	55
6	20961.86	97778.32	21438.14	466458.32	102272.15	477056.99	54
7	20990.30	97772.22	21468.57	465797.21	102278.53	476410.58	53
8	21018.74	97766.11	21499.00	465137.88	102284.92	475765.96	52
9	21047.18	97759.99	21529.44	464480.34	102291.32	475123.12	51
10	21075.61	97753.86	21559.88	463824.57	102297.73	474482.06	50
11	21104.05	97747.73	21590.32	463170.56	102304.15	473842.77	49
12	21132.48	97741.59	21620.77	462518.32	102310.58	473205.23	48
13	21160.91	97735.44	21651.22	461867.83	102317.02	472569.45	47
14	21189.34	97729.28	21681.67	461219.08	102323.47	471935.42	46
15	21217.77	97723.11	21712.13	460572.07	102329.93	471303.13	45
16	21246.19	97716.93	21742.59	459926.80	102336.40	470672.56	44
17	21274.62	97710.75	21773.06	459283.25	102342.88	470043.72	43
18	21303.04	97704.56	21803.53	458641.41	102349.37	469416.60	42
19	21331.46	97698.36	21834.00	458001.29	102355.87	468791.19	41
20	21359.88	97692.15	21864.48	457362.87	102362.38	468167.48	40
21	21388.29	97685.93	21894.96	456726.14	102368.90	467545.48	39
22	21416.71	97679.70	21925.44	456091.11	102375.43	466925.16	38
23	21445.12	97673.47	21955.93	455457.76	102381.96	466306.52	37
24	21473.53	97667.23	21986.42	454826.08	102388.50	465689.56	36
25	21501.94	97660.98	22016.92	454196.08	102395.05	465074.27	35
26	21530.35	97654.72	22047.42	453567.73	102401.61	464460.64	34
27	21558.76	97648.45	22077.93	452941.05	102408.18	463848.67	33
28	21587.16	97642.17	22108.44	452316.01	102414.76	463238.35	32
29	21615.56	97635.89	22138.95	451692.61	102421.35	462629.67	31
30	21643.96	97629.60	22169.47	451070.85	102427.95	462022.63	30

12	Sinus		Tangens		Secans		
30	21643.96	97629.60	22169.47	451070.85	102427.95	462022.63	30
31	21672.36	97623.30	22199.99	450450.72	102434.56	461417.22	29
32	21700.76	97616.99	22230.51	449832.21	102441.18	460813.43	28
33	21729.15	97610.67	22261.04	449215.32	102447.81	460211.26	27
34	21757.54	97604.35	22291.57	448600.04	102454.45	459610.70	26
35	21785.93	97598.02	22322.11	447986.36	102461.10	459011.74	25
36	21814.32	97591.68	22352.65	447374.28	102467.76	458414.39	24
37	21842.71	97585.33	22383.19	446763.79	102474.43	457818.62	23
38	21871.10	97578.97	22413.74	446154.89	102481.11	457224.44	22
39	21899.48	97572.60	22444.29	445547.56	102487.80	456631.83	21
40	21927.86	97566.23	22474.85	444941.81	102494.49	456040.80	20
41	21956.24	97559.85	22505.41	444337.62	102501.19	455451.34	19
42	21984.62	97553.46	22535.97	443734.99	102507.90	454863.44	18
43	22013.00	97547.06	22566.54	443133.92	102514.62	454277.09	17
44	22041.37	97540.65	22597.11	442534.39	102521.35	453692.29	16
45	22069.74	97534.23	22627.69	441936.41	102528.09	453109.03	15
46	22098.11	97527.81	22658.27	441339.96	102534.84	452527.30	14
47	22126.48	97521.38	22688.85	440745.04	102541.60	451947.11	13
48	22154.85	97514.94	22719.44	440151.64	102548.37	451368.44	12
49	22183.21	97508.49	22750.03	439559.76	102555.15	450792.29	11
50	22211.58	97502.03	22780.63	438969.40	102561.94	450215.65	10
51	22239.94	97495.56	22811.23	438380.54	102568.74	449641.52	9
52	22268.30	97489.09	22841.83	437793.17	102575.55	449068.89	8
53	22296.66	97482.61	22872.44	437207.31	102582.37	448497.75	7
54	22325.01	97476.12	22903.05	436622.93	102589.20	447928.10	6
55	22353.37	97469.62	22933.67	436040.03	102596.04	447359.93	5
56	22381.72	97463.11	22964.29	435458.61	102602.89	446793.24	4
57	22410.07	97456.60	22994.92	434878.66	102609.75	446228.03	3
58	22438.41	97450.08	23025.55	434300.18	102616.62	445664.28	2
59	22466.76	97443.55	23056.18	433723.16	102623.50	445101.98	1
60	22495.11	97437.01	23086.82	433147.59	102630.39	444541.15	0

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13	Sinus		Tangens		Secans		
0	22495.11	97437.01	23086.82	433147.59	102630.39	444541.15	60
1	22523.45	97430.46	23117.46	432573.47	102637.29	443981.76	59
2	22551.79	97423.90	23148.11	432000.79	102644.20	443423.82	58
3	22580.13	97417.34	23178.76	431429.55	102651.12	442867.31	57
4	22608.46	97410.77	23209.41	430859.74	102658.05	442312.24	56
5	22636.80	97404.19	23240.07	430291.36	102664.99	441758.59	55
6	22665.13	97397.60	23270.73	429724.40	102671.94	441206.37	54
7	22693.46	97391.00	23301.40	429158.85	102678.90	440655.56	53
8	22721.79	97384.39	23332.07	428594.72	102685.87	440106.16	52
9	22750.12	97377.78	23362.74	428031.99	102692.84	439558.17	51
10	22778.44	97371.16	23393.42	427470.66	102699.82	439011.58	50
11	22806.77	97364.53	23424.10	426910.72	102706.81	438466.38	49
12	22835.09	97357.89	23454.79	426352.18	102713.81	437922.57	48
13	22863.41	97351.24	23485.48	425795.01	102720.82	437380.15	47
14	22891.72	97344.58	23516.17	425239.23	102727.84	436839.10	46
15	22920.04	97337.92	23546.87	424684.82	102734.87	436299.43	45
16	22948.35	97331.25	23577.58	424131.77	102741.91	435761.13	44
17	22976.66	97324.57	23608.29	423580.09	102748.96	435224.19	43
18	23004.97	97317.88	23639.00	423029.77	102756.02	434688.61	42
19	23033.28	97311.18	23669.72	422480.80	102763.09	434154.38	41
20	23061.59	97304.48	23700.44	421933.18	102770.17	433621.50	40
21	23089.89	97297.77	23731.16	421386.90	102777.26	433089.96	39
22	23118.19	97291.05	23761.89	420841.96	102784.36	432559.77	38
23	23146.49	97284.32	23792.62	420298.35	102791.47	432030.90	37
24	23174.79	97277.58	23823.36	419756.06	102798.59	431503.36	36
25	23203.09	97270.84	23854.10	419215.10	102805.72	430977.15	35
26	23231.38	97264.09	23884.85	418675.46	102812.86	430452.25	34
27	23259.67	97257.33	23915.60	418137.13	102820.01	429928.67	33
28	23287.96	97250.56	23946.35	417600.11	102827.17	429406.40	32
29	23316.25	97243.78	23977.11	417064.40	102834.34	428885.43	31
30	23344.54	97236.99	24007.87	416529.98	102841.52	428365.76	30
							76

13	Sinus		Tangens		Secans		
30	23344.54	97236.99	24007.87	416529.98	102841.52	428365.76	30
31	23372.82	97230.19	24038.64	415996.85	102848.71	427847.38	29
32	23401.10	97223.39	24069.41	415465.01	102855.91	427330.29	28
33	23429.38	97216.58	24100.19	414934.46	102863.12	426814.49	27
34	23457.66	97209.76	24130.97	414405.19	102870.34	426299.96	26
35	23485.94	97202.93	24161.76	413877.19	102877.57	425786.71	25
36	23514.21	97196.09	24192.55	413350.46	102884.81	425274.74	24
37	23542.48	97189.25	24223.34	412824.99	102892.06	424764.02	23
38	23570.75	97182.40	24254.14	412300.79	102899.32	424254.57	22
39	23599.02	97175.54	24284.94	411777.84	102906.58	423746.37	21
40	23627.29	97168.67	24315.75	411256.14	102913.85	423239.43	20
41	23655.55	97161.79	24346.56	410735.69	102921.13	422733.73	19
42	23683.81	97154.91	24377.37	410216.49	102928.42	422229.28	18
43	23712.07	97148.02	24408.19	409698.52	102935.72	421726.06	17
44	23740.33	97141.12	24439.01	409181.78	102943.03	421224.08	16
45	23768.59	97134.21	24469.84	408666.27	102950.35	420723.33	15
46	23796.84	97127.29	24500.67	408151.99	102957.68	420223.80	14
47	23825.10	97120.36	24531.51	407638.92	102965.02	419725.49	13
48	23853.35	97113.43	24562.35	407127.07	102972.37	419228.40	12
49	23881.59	97106.49	24593.20	406616.43	102979.73	418732.52	11
50	23909.84	97099.54	24624.05	406107.00	102987.10	418237.85	10
51	23938.08	97092.58	24654.91	405598.77	102994.48	417744.38	9
52	23966.33	97085.61	24685.77	405091.74	103001.87	417252.10	8
53	23994.57	97078.63	24716.63	404585.90	103009.27	416761.02	7
54	24022.80	97071.65	24747.50	404081.25	103016.68	416271.14	6
55	24051.04	97064.66	24778.37	403577.79	103024.10	415782.43	5
56	24079.27	97057.66	24809.25	403075.50	103031.53	415294.91	4
57	24107.51	97050.65	24840.13	402574.40	103038.97	414808.56	3
58	24135.74	97043.63	24871.02	402074.46	103046.42	414323.39	2
59	24163.96	97036.60	24901.91	401575.70	103053.88	413839.39	1
60	24192.19	97029.57	24932.80	401078.09	103061.35	413356.55	0

14	Sinus		Tangens		Secans		
0	24192.19	97029.57	24932.80	401078.09	103061.35	413356.55	60
1	24220.41	97022.53	24963.70	400581.65	103068.83	412874.87	59
2	24248.63	97015.48	24994.60	400086.36	103076.32	412394.35	58
3	24276.85	97008.42	25025.51	399592.23	103083.82	411914.98	57
4	24305.07	97001.35	25056.42	399099.24	103091.33	411436.75	56
5	24333.29	96994.28	25087.34	398607.39	103098.85	410959.67	55
6	24361.50	96987.20	25118.26	398116.69	103106.38	410483.74	54
7	24389.71	96980.11	25149.19	397627.12	103113.92	410008.93	53
8	24417.92	96973.01	25180.12	397138.68	103121.47	409535.26	52
9	24446.13	96965.90	25211.06	396651.37	103129.03	409062.72	51
10	24474.33	96958.79	25242.00	396165.18	103136.60	408591.30	50
11	24502.54	96951.67	25272.94	395680.11	103144.18	408121.00	49
12	24530.74	96944.54	25303.89	395196.15	103151.77	407651.81	48
13	24558.94	96937.40	25334.84	394713.31	103159.36	407183.74	47
14	24587.13	96930.25	25365.80	394231.57	103166.97	406716.77	46
15	24615.33	96923.09	25396.76	393750.94	103174.59	406250.91	45
16	24643.52	96915.92	25427.73	393271.41	103182.22	405786.15	44
17	24671.71	96908.75	25458.70	392792.97	103189.85	405322.49	43
18	24699.90	96901.57	25489.68	392315.63	103197.50	404859.92	42
19	24728.09	96894.38	25520.66	391839.37	103205.16	404398.44	41
20	24756.27	96887.18	25551.65	391364.20	103212.82	403938.04	40
21	24784.45	96879.98	25582.64	390890.11	103220.50	403478.72	39
22	24812.63	96872.77	25613.63	390417.10	103228.18	403020.48	38
23	24840.81	96865.55	25644.63	389945.16	103235.88	402563.32	37
24	24868.99	96858.32	25675.63	389474.29	103243.59	402107.22	36
25	24897.16	96851.08	25706.64	389004.48	103251.30	401652.19	35
26	24925.33	96843.83	25737.66	388535.74	103259.03	401198.23	34
27	24953.50	96836.57	25768.68	388068.05	103266.76	400745.32	33
28	24981.67	96829.31	25799.70	387601.42	103274.51	400293.47	32
29	25009.84	96822.04	25830.73	387135.84	103282.27	399842.67	31
30	25038.00	96814.76	25861.76	386671.31	103290.03	399392.92	30

14	Sinus		Tangens		Secans		
30	25038.00	96814.76	25861.76	386671.31	103290.03	399392.92	30
31	25066.16	96807.47	25892.80	386207.82	103297.81	398944.21	29
32	25094.32	96800.18	25923.84	385745.37	103305.59	398496.54	28
33	25122.48	96792.88	25954.88	385283.96	103313.39	398049.91	27
34	25150.63	96785.57	25985.93	384823.58	103321.19	397604.31	26
35	25178.79	96778.25	26016.99	384364.24	103329.01	397159.75	25
36	25206.94	96770.92	26048.05	383905.91	103336.83	396716.21	24
37	25235.08	96763.58	26079.11	383448.61	103344.67	396273.69	23
38	25263.23	96756.23	26110.18	382992.33	103352.51	395832.19	22
39	25291.37	96748.88	26141.26	382537.07	103360.37	395391.71	21
40	25319.52	96741.52	26172.34	382082.81	103368.23	394952.24	20
41	25347.66	96734.15	26203.42	381629.57	103376.11	394513.79	19
42	25375.79	96726.77	26234.51	381177.33	103383.99	394076.33	18
43	25403.93	96719.38	26265.60	380726.09	103391.88	393639.88	17
44	25432.06	96711.99	26296.70	380275.85	103399.79	393204.43	16
45	25460.19	96704.59	26327.80	379826.61	103407.70	392769.97	15
46	25488.32	96697.18	26358.91	379378.35	103415.63	392336.51	14
47	25516.45	96689.76	26390.02	378931.09	103423.56	391904.03	13
48	25544.58	96682.33	26421.14	378484.81	103431.51	391472.54	12
49	25572.70	96674.90	26452.26	378039.51	103439.46	391042.03	11
50	25600.82	96667.46	26483.39	377595.19	103447.43	390612.50	10
51	25628.94	96660.01	26514.52	377151.85	103455.40	390183.95	9
52	25657.05	96652.55	26545.66	376709.47	103463.38	389756.37	8
53	25685.17	96645.08	26576.80	376268.07	103471.38	389329.76	7
54	25713.28	96637.60	26607.94	375827.63	103479.38	388904.11	6
55	25741.39	96630.12	26639.09	375388.15	103487.40	388479.43	5
56	25769.50	96622.63	26670.25	374949.63	103495.42	388055.70	4
57	25797.60	96615.13	26701.41	374512.07	103503.46	387632.93	3
58	25825.70	96607.62	26732.57	374075.46	103511.50	387211.12	2
59	25853.81	96600.10	26763.74	373639.80	103519.55	386790.25	1
60	25881.90	96592.58	26794.92	373205.08	103527.62	386370.33	0

15	Sinus		Tangens		Secans		
0	25881.90	96592.58	26794.92	373205.08	103527.62	386370.33	60
1	25910.00	96585.05	26826.10	372771.31	103535.69	385951.35	59
2	25938.10	96577.51	26857.28	372338.47	103543.78	385533.32	58
3	25966.19	96569.96	26888.47	371906.58	103551.87	385116.22	57
4	25994.28	96562.40	26919.67	371475.61	103559.98	384700.05	56
5	26022.37	96554.83	26950.87	371045.58	103568.09	384284.82	55
6	26050.45	96547.26	26982.07	370616.48	103576.21	383870.51	54
7	26078.53	96539.68	27013.28	370188.30	103584.35	383457.13	53
8	26106.61	96532.09	27044.49	369761.03	103592.49	383044.67	52
9	26134.69	96524.49	27075.71	369334.69	103600.65	382633.13	51
10	26162.77	96516.88	27106.93	368909.27	103608.81	382222.51	50
11	26190.85	96509.27	27138.16	368484.75	103616.99	381812.80	49
12	26218.92	96501.65	27169.40	368061.15	103625.17	381403.99	48
13	26246.99	96494.02	27200.64	367638.45	103633.37	380996.10	47
14	26275.06	96486.38	27231.88	367216.65	103641.57	380589.11	46
15	26303.12	96478.73	27263.13	366795.75	103649.79	380183.01	45
16	26331.18	96471.07	27294.38	366375.75	103658.01	379777.82	44
17	26359.24	96463.41	27325.64	365956.65	103666.25	379373.52	43
18	26387.30	96455.74	27356.90	365538.44	103674.49	378970.11	42
19	26415.36	96448.06	27388.17	365121.11	103682.75	378567.60	41
20	26443.42	96440.37	27419.44	364704.67	103691.01	378165.96	40
21	26471.47	96432.67	27450.72	364289.11	103699.29	377765.22	39
22	26499.52	96424.97	27482.01	363874.44	103707.57	377365.35	38
23	26527.57	96417.26	27513.30	363460.64	103715.87	376966.36	37
24	26555.61	96409.54	27544.59	363047.71	103724.17	376568.24	36
25	26583.65	96401.81	27575.89	362635.66	103732.49	376171.00	35
26	26611.69	96394.07	27607.19	362224.47	103740.82	375774.62	34
27	26639.73	96386.33	27638.50	361814.15	103749.15	375379.11	33
28	26667.77	96378.58	27669.81	361404.69	103757.50	374984.47	32
29	26695.81	96370.82	27701.13	360996.09	103765.85	374590.68	31
30	26723.84	96363.05	27732.45	360588.35	103774.22	374197.75	30

15	Sinus		Tangens		Secans		
30	26723.84	96363.05	27732.45	360588.35	103774.22	374197.75	30
31	26751.87	96355.27	27763.78	360181.46	103782.60	373805.68	29
32	26779.89	96347.48	27795.12	359775.43	103790.98	373414.46	28
33	26807.92	96339.69	27826.46	359370.24	103799.38	373024.09	27
34	26835.94	96331.89	27857.80	358965.90	103807.79	372634.57	26
35	26863.96	96324.08	27889.15	358562.41	103816.21	372245.89	25
36	26891.98	96316.26	27920.50	358159.75	103824.63	371858.05	24
37	26920.00	96308.43	27951.86	357757.94	103833.07	371471.05	23
38	26948.01	96300.59	27983.22	357356.96	103841.52	371084.89	22
39	26976.02	96292.75	28014.59	356956.81	103849.98	370699.56	21
40	27004.03	96284.90	28045.97	356557.49	103858.44	370315.06	20
41	27032.04	96277.04	28077.35	356159.00	103866.92	369931.39	19
42	27060.04	96269.17	28108.73	355761.33	103875.41	369548.54	18
43	27088.05	96261.30	28140.12	355364.49	103883.91	369166.52	17
44	27116.05	96253.42	28171.52	354968.46	103892.42	368785.32	16
45	27144.04	96245.53	28202.92	354573.25	103900.94	368404.93	15
46	27172.04	96237.63	28234.32	354178.86	103909.47	368025.36	14
47	27200.03	96229.72	28265.73	353785.28	103918.00	367646.60	13
48	27228.02	96221.80	28297.15	353392.51	103926.55	367268.65	12
49	27256.01	96213.87	28328.57	353000.54	103935.11	366891.51	11
50	27284.00	96205.94	28359.99	352609.38	103943.68	366515.18	10
51	27311.98	96198.00	28391.42	352219.02	103952.26	366139.64	9
52	27339.96	96190.05	28422.86	351829.46	103960.85	36576491	8
53	27367.94	96182.09	28454.30	351440.70	103969.45	365390.97	7
54	27395.92	96174.13	28485.75	351052.73	103978.06	365017.83	6
55	27423.90	96166.16	28517.20	350665.55	103986.69	364645.48	5
56	27451.87	96158.18	28548.66	350279.16	103995.32	364273.92	4
57	27479.84	96150.19	28580.12	349893.56	104003.96	363903.15	3
58	27507.81	96142.19	28611.59	349508.74	104012.61	363533.16	2
59	27535.78	96134.18	28643.06	349124.70	104021.27	363163.95	1
60	27563.74	96126.17	28674.54	348741.44	104029.94	362795.53	0

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16	Sinus		Tangens		Secans		
0	27563.74	96126.17	28674.54	348741.44	104029.94	362795.53	60
1	27591.70	96118.15	28706.02	348358.96	104038.63	362427.88	59
2	27619.65	96110.12	28737.51	347977.26	104047.32	362061.01	58
3	27647.61	96102.08	28769.00	347596.32	104056.02	361694.90	57
4	27675.56	96094.03	28800.50	347216.16	104064.73	361329.57	56
5	27703.52	96085.98	28832.01	346836.76	104073.46	360965.01	55
6	27731.47	96077.92	28863.52	346458.13	104082.19	360601.21	54
7	27759.41	96069.85	28895.03	346080.26	104090.94	360238.18	53
8	27787.36	96061.77	28926.55	345703.15	104099.69	359875.90	52
9	27815.30	96053.68	28958.08	345326.79	104108.45	359514.39	51
10	27843.24	96045.58	28989.61	344951.20	104117.23	359153.63	50
11	27871.18	96037.48	29021.14	344576.35	104126.01	358793.62	49
12	27899.11	96029.37	29052.68	344202.26	104134.81	358434.37	48
13	27927.04	96021.25	29084.23	343828.91	104143.62	358075.86	47
14	27954.97	96013.12	29115.78	343456.31	104152.43	357718.10	46
15	27982.90	96004.98	29147.34	343084.46	104161.26	357361.08	45
16	28010.83	95996.84	29178.90	342713.34	104170.09	357004.81	44
17	28038.75	95988.69	29210.47	342342.97	104178.94	356649.28	43
18	28066.67	95980.53	29242.05	341973.33	104187.80	356294.48	42
19	28094.59	95972.36	29273.63	341604.43	104196.67	355940.42	41
20	28122.51	95964.18	29305.21	341236.26	104205.54	355587.10	40
21	28150.42	95956.00	29336.80	340868.82	104214.43	355234.50	39
22	28178.33	95947.81	29368.39	340502.10	104223.33	354882.63	38
23	28206.24	95939.61	29399.99	340136.12	104232.24	354531.49	37
24	28234.15	95931.40	29431.60	339770.85	104241.16	354181.07	36
25	28262.05	95923.18	29463.21	339406.31	104250.09	353831.38	35
26	28289.95	95914.95	29494.83	339042.49	104259.03	353482.40	34
27	28317.85	95906.72	29526.45	338679.38	104267.98	353134.14	33
28	28345.75	95898.48	29558.08	338316.99	104276.94	352786.60	32
29	28373.64	95890.23	29589.71	337955.31	104285.91	352439.77	31
30	28401.53	95881.97	29621.35	337594.34	104294.89	352093.65	30

16	Sinus		Tangens		Secans		
30	28401.53	95881.97	29621.35	337594.34	104294.89	352093.65	30
31	28429.42	95873.70	29652.99	337234.08	104303.88	351748.24	29
32	28457.31	95865.43	29684.64	336874.53	104312.89	351403.54	28
33	28485.20	95857.15	29716.30	336515.68	104321.90	351059.54	27
34	28513.08	95848.86	29747.96	336157.53	104330.92	350716.25	26
35	28540.96	95840.56	29779.62	335800.08	104339.95	350373.65	25
36	28568.84	95832.25	29811.29	335443.33	104349.00	350031.75	24
37	28596.71	95823.94	29842.97	335087.28	104358.05	349690.55	23
38	28624.58	95815.62	29874.65	334731.91	104367.12	349350.04	22
39	28652.45	95807.29	29906.34	334377.24	104376.19	349010.23	21
40	28680.32	95798.95	29938.03	334023.26	104385.28	348671.10	20
41	28708.19	95790.60	29969.73	333669.97	104394.37	348332.67	19
42	28736.05	95782.25	30001.44	333317.36	104403.48	347994.92	18
43	28763.91	95773.89	30033.15	332965.43	104412.59	347657.85	17
44	28791.77	95765.52	30064.86	332614.19	104421.72	347321.46	16
45	28819.63	95757.14	30096.58	332263.62	104430.86	346985.76	15
46	28847.48	95748.75	30128.31	331913.73	104440.01	346650.73	14
47	28875.33	95740.35	30160.04	331564.52	104449.17	346316.37	13
48	28903.18	95731.95	30191.78	331215.98	104458.33	345982.69	12
49	28931.03	95723.54	30223.52	330868.11	104467.51	345649.69	11
50	28958.87	95715.12	30255.27	330520.91	104476.70	345317.35	10
51	28986.71	95706.69	30287.03	330174.38	104485.90	344985.68	9
52	29014.55	95698.25	30318.79	329828.51	104495.11	344654.67	8
53	29042.39	95689.81	30350.55	329483.30	104504.33	344324.33	7
54	29070.22	95681.36	30382.32	329138.76	104513.57	343994.65	6
55	29098.05	95672.90	30414.10	328794.87	104522.81	343665.63	5
56	29125.88	95664.43	30445.88	328451.64	104532.06	343337.27	4
57	29153.71	95655.95	30477.67	328109.07	104541.32	343009.56	3
58	29181.53	95647.47	30509.46	327767.15	104550.60	342682.51	2
59	29209.35	95638.98	30541.26	327425.88	104559.88	342356.11	1
60	29237.17	95630.48	30573.07	327085.26	104569.18	342030.36	0

17	Sinus		Tangens		Secans		
0	29237.17	95630.48	30573.07	327085.26	104569.18	342030.36	60
1	29264.99	95621.97	30604.88	326745.29	104578.48	341705.26	59
2	29292.80	95613.45	30636.69	326405.96	104587.80	341380.80	58
3	29320.61	95604.92	30668.51	326067.28	104597.12	341056.99	57
4	29348.42	95596.39	30700.34	325729.24	104606.46	340733.82	56
5	29376.23	95587.85	30732.18	325391.84	104615.81	340411.30	55
6	29404.03	95579.30	30764.02	325055.08	104625.16	340089.41	54
7	29431.83	95570.74	30795.86	324718.95	104634.53	339768.16	53
8	29459.63	95562.17	30827.71	324383.46	104643.91	339447.54	52
9	29487.43	95553.60	30859.57	324048.60	104653.30	339127.55	51
10	29515.22	95545.02	30891.43	323714.38	104662.70	338808.20	50
11	29543.01	95536.43	30923.30	323380.78	104672.11	338489.48	49
12	29570.80	95527.83	30955.17	323047.80	104681.53	338171.38	48
13	29598.59	95519.22	30987.05	322715.46	104690.96	337853.91	47
14	29626.38	95510.61	31018.93	322383.73	104700.40	337537.07	46
15	29654.16	95501.99	31050.82	322052.63	104709.86	337220.84	45
16	29681.94	95493.36	31082.72	321722.15	104719.32	336905.24	44
17	29709.71	95484.72	31114.62	321392.28	104728.79	336590.26	43
18	29737.49	95476.07	31146.53	321063.04	104738.28	336275.89	42
19	29765.26	95467.42	31178.44	320734.40	104747.77	335962.14	41
20	29793.03	95458.76	31210.36	320406.38	104757.28	335649.00	40
21	29820.79	95450.09	31242.29	320078.97	104766.79	335336.47	39
22	29848.56	95441.41	31274.22	319752.17	104776.32	335024.55	38
23	29876.32	95432.72	31306.16	319425.98	104785.86	334713.24	37
24	29904.08	95424.03	31338.10	319100.39	104795.40	334402.54	36
25	29931.84	95415.33	31370.05	318775.40	104804.96	334092.44	35
26	29959.59	95406.62	31402.00	318451.02	104814.53	333782.94	34
27	29987.34	95397.90	31433.96	318127.24	104824.11	333474.05	33
28	30015.09	95389.17	31465.93	317804.06	104833.70	333165.75	32
29	30042.84	95380.43	31497.90	317481.47	104843.30	332858.05	31
30	30070.58	95371.69	31529.88	317159.48	104852.91	332550.95	30

17	Sinus		Tangens		Secans		
30	30070.58	95371.69	31529.88	317159.48	104852.91	332550.95	30
31	30098.32	95362.94	31561.86	316838.08	104862.53	332244.44	29
32	30126.06	95354.18	31593.85	316517.28	104872.17	331938.53	28
33	30153.80	95345.41	31625.85	316197.06	104881.81	331633.20	27
34	30181.53	95336.64	31657.85	315877.44	104891.46	331328.47	26
35	30209.26	95327.86	31689.86	315558.40	104901.13	331024.32	25
36	30236.99	95319.07	31721.87	315239.94	104910.80	330720.76	24
37	30264.71	95310.27	31753.89	314922.07	104920.49	330417.78	23
38	30292.44	95301.46	31785.91	314604.78	104930.19	330115.39	22
39	30320.16	95292.64	31817.94	314288.07	104939.89	329813.57	21
40	30347.88	95283.82	31849.98	313971.94	104949.61	329512.34	20
41	30375.59	95274.99	31882.02	313656.39	104959.34	329211.68	19
42	30403.31	95266.15	31914.07	313341.41	104969.08	328911.60	18
43	30431.02	95257.30	31946.13	313027.01	104978.83	328612.09	17
44	30458.72	95248.44	31978.19	312713.17	104988.59	328313.16	16
45	30486.43	95239.58	32010.25	312399.91	104998.36	328014.79	15
46	30514.13	95230.71	32042.32	312087.22	105008.15	327717.00	14
47	30541.83	95221.83	32074.40	311775.09	105017.94	327419.77	13
48	30569.53	95212.94	32106.49	311463.53	105027.74	327123.11	12
49	30597.23	95204.04	32138.58	311152.54	105037.56	326827.02	11
50	30624.92	95195.14	32170.67	310842.10	105047.38	326531.49	10
51	30652.61	95186.23	32202.77	310532.23	105057.22	326236.52	9
52	30680.29	95177.31	32234.88	310222.91	105067.06	325942.11	8
53	30707.98	95168.38	32267.00	309914.16	105076.92	325648.25	7
54	30735.66	95159.44	32299.12	309605.96	105086.79	325354.96	6
55	30763.34	95150.49	32331.25	309298.31	105096.67	325062.22	5
56	30791.02	95141.54	32363.38	308991.22	105106.56	324770.03	4
57	30818.69	95132.58	32395.52	308684.68	105116.46	324478.40	3
58	30846.36	95123.61	32427.66	308378.69	105126.37	324187.32	2
59	30874.03	95114.63	32459.81	308073.25	105136.29	323896.78	1
60	30901.70	95105.65	32491.97	307768.35	105146.22	323606.80	0

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18	Sinus		Tangens		Secans		
0	30901.70	95105.65	32491.97	307768.35	105146.22	323606.80	60
1	30929.36	95096.66	32524.13	307464.00	105156.17	323317.36	59
2	30957.02	95087.66	32556.30	307160.20	105166.12	323028.46	58
3	30984.68	95078.65	32588.48	306856.93	105176.08	322740.11	57
4	31012.34	95069.63	32620.66	306554.21	105186.06	322452.30	56
5	31039.99	95060.60	32652.85	306252.03	105196.05	322165.03	55
6	31067.64	95051.57	32685.04	305950.38	105206.04	321878.30	54
7	31095.29	95042.53	32717.24	305649.28	105216.05	321592.10	53
8	31122.94	95033.48	32749.44	305348.70	105226.07	321306.44	52
9	31150.58	95024.42	32781.65	305048.66	105236.10	321021.32	51
10	31178.22	95015.36	32813.87	304749.15	105246.14	320736.73	50
11	31205.86	95006.29	32846.10	304450.18	105256.19	320452.66	49
12	31233.49	94997.21	32878.33	304151.73	105266.25	320169.13	48
13	31261.12	94988.12	32910.56	303853.81	105276.33	319886.13	47
14	31288.75	94979.02	32942.80	303556.41	105286.41	319603.65	46
15	31316.38	94969.91	32975.05	303259.54	105296.51	319321.70	45
16	31344.00	94960.80	33007.31	302963.20	105306.61	319040.28	44
17	31371.63	94951.68	33039.57	302667.37	105316.73	318759.37	43
18	31399.25	94942.55	33071.84	302372.07	105326.86	318478.99	42
19	31426.86	94933.41	33104.11	302077.28	105336.99	318199.13	41
20	31454.48	94924.26	33136.39	301783.01	105347.14	317919.78	40
21	31482.09	94915.11	33168.68	301489.26	105357.30	317640.95	39
22	31509.69	94905.95	33200.97	301196.02	105367.47	317362.64	38
23	31537.30	94896.78	33233.27	300903.30	105377.65	317084.84	37
24	31564.90	94887.60	33265.57	300611.09	105387.85	316807.56	36
25	31592.50	94878.41	33297.88	300319.39	105398.05	316530.78	35
26	31620.10	94869.22	33330.20	300028.20	105408.26	316254.52	34
27	31647.70	94860.02	33362.52	299737.51	105418.49	315978.76	33
28	31675.29	94850.81	33394.85	299447.34	105428.73	315703.51	32
29	31702.88	94841.59	33427.19	299157.66	105438.97	315428.77	31
30	31730.47	94832.36	33459.53	298868.50	105449.23	315154.53	30

18	Sinus		Tangens		Secans		
30	31730.47	94832.36	33459.53	298868.50	105449.23	315154.53	30
31	31758.05	94823.13	33491.88	298579.83	105459.50	314880.79	29
32	31785.63	94813.89	33524.24	298291.66	105469.78	314607.56	28
33	31813.21	94804.64	33556.60	298004.00	105480.07	314334.83	27
34	31840.79	94795.38	33588.97	297716.83	105490.37	314062.59	26
35	31868.36	94786.11	33621.34	297430.16	105500.68	313790.86	25
36	31895.93	94776.84	33653.72	297143.99	105511.01	313519.62	24
37	31923.50	94767.56	33686.11	296858.31	105521.34	313248.87	23
38	31951.06	94758.27	33718.50	296573.12	105531.69	312978.62	22
39	31978.63	94748.97	33750.90	296288.42	105542.04	312708.86	21
40	32006.19	94739.66	33783.30	296004.22	105552.41	312439.59	20
41	32033.74	94730.35	33815.71	295720.50	105562.79	312170.81	19
42	32061.30	94721.03	33848.13	295437.27	105573.18	311902.52	18
43	32088.85	94711.70	33880.56	295154.53	105583.58	311634.72	17
44	32116.40	94702.36	33912.99	294872.27	105593.99	311367.40	16
45	32143.95	94693.01	33945.43	294590.50	105604.41	311100.57	15
46	32171.49	94683.66	33977.87	294309.21	105614.85	310834.22	14
47	32199.03	94674.30	34010.32	294028.40	105625.29	310568.35	13
48	32226.57	94664.93	34042.78	293748.07	105635.75	310302.96	12
49	32254.10	94655.55	34075.24	293468.22	105646.21	310038.05	11
50	32281.64	94646.16	34107.71	293188.85	105656.69	309773.63	10
51	32309.17	94636.76	34140.19	292909.95	105667.18	309509.67	9
52	32336.70	94627.36	34172.67	292631.52	105677.68	309246.20	8
53	32364.22	94617.95	34205.16	292353.58	105688.19	308983.19	7
54	32391.74	94608.53	34237.65	292076.10	105698.71	308720.66	6
55	32419.26	94599.10	34270.15	291799.09	105709.24	308458.60	5
56	32446.78	94589.67	34302.66	291522.56	105719.78	308197.02	4
57	32474.29	94580.23	34335.18	291246.49	105730.34	307935.90	3
58	32501.80	94570.78	34367.70	290970.89	105740.90	307675.25	2
59	32529.31	94561.32	34400.23	290695.76	105751.48	307415.07	1
60	32556.82	94551.85	34432.76	290421.09	105762.07	307155.35	0

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19	Sinus		Tangens		Secans		
0	32556.82	94551.85	34432.76	290421.09	105762.07	307155.35	60
1	32584.32	94542.38	34465.30	290146.88	105772.67	306896.10	59
2	32611.82	94532.90	34497.85	289873.14	105783.28	306637.31	58
3	32639.31	94523.41	34530.40	289599.86	105793.90	306378.98	57
4	32666.81	94513.91	34562.96	289327.04	105804.53	306121.11	56
5	32694.30	94504.40	34595.53	289054.67	105815.17	305863.70	55
6	32721.79	94494.89	34628.10	288782.77	105825.83	305606.75	54
7	32749.28	94485.37	34660.68	288511.32	105836.49	305350.26	53
8	32776.76	94475.84	34693.27	288240.33	105847.17	305094.23	52
9	32804.24	94466.30	34725.86	287969.79	105857.86	304838.64	51
10	32831.72	94456.75	34758.46	287699.70	105868.55	304583.52	50
11	32859.19	94447.20	34791.07	287430.07	105879.26	304328.84	49
12	32886.66	94437.64	34823.68	287160.88	105889.99	304074.62	48
13	32914.13	94428.07	34856.30	286892.15	105900.72	303820.84	47
14	32941.60	94418.49	34888.93	286623.86	105911.46	303567.52	46
15	32969.06	94408.90	34921.56	286356.02	105922.21	303314.64	45
16	32996.52	94399.31	34954.20	286088.63	105932.98	303062.21	44
17	33023.98	94389.71	34986.85	285821.68	105943.76	302810.23	43
18	33051.44	94380.10	35019.50	285555.17	105954.54	302558.68	42
19	33078.89	94370.48	35052.16	285289.11	105965.34	302307.59	41
20	33106.34	94360.85	35084.83	285023.49	105976.15	302056.93	40
21	33133.79	94351.21	35117.50	284758.31	105986.97	301806.72	39
22	33161.23	94341.57	35150.18	284493.56	105997.81	301556.94	38
23	33188.67	94331.92	35182.87	284229.26	106008.65	301307.60	37
24	33216.11	94322.26	35215.56	283965.39	106019.51	301058.70	36
25	33243.55	94312.60	35248.26	283701.96	106030.37	300810.24	35
26	33270.98	94302.93	35280.97	283438.96	106041.25	300562.21	34
27	33298.41	94293.25	35313.68	283176.39	106052.14	300314.62	33
28	33325.84	94283.56	35346.40	282914.26	106063.04	300067.46	32
29	33353.27	94273.86	35379.13	282652.56	106073.95	299820.73	31
30	33380.69	94264.15	35411.86	282391.29	106084.87	299574.43	30

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19	Sinus		Tangens		Secans		
30	33380.69	94264.15	35411.86	282391.29	106084.87	299574.43	30
31	33408.10	94254.43	35444.60	282130.45	106095.80	299328.56	29
32	33435.52	94244.71	35477.35	281870.03	106106.75	299083.12	28
33	33462.93	94234.98	35510.10	281610.04	106117.70	298838.11	27
34	33490.34	94225.24	35542.86	281350.48	106128.67	298593.52	26
35	33517.75	94215.50	35575.63	281091.34	106139.65	298349.36	25
36	33545.16	94205.75	35608.40	280832.63	106150.64	298105.63	24
37	33572.56	94195.99	35641.18	280574.33	106161.64	297862.31	23
38	33599.96	94186.22	35673.97	280316.46	106172.65	297619.42	22
39	33627.35	94176.44	35706.76	280059.01	106183.67	297376.95	21
40	33654.75	94166.65	35739.56	279801.98	106194.71	297134.90	20
41	33682.14	94156.85	35772.37	279545.37	106205.75	296893.27	19
42	33709.53	94147.05	35805.18	279289.17	106216.81	296652.05	18
43	33736.91	94137.24	35838.00	279033.39	106227.88	296411.25	17
44	33764.29	94127.42	35870.83	278778.02	106238.96	296170.87	16
45	33791.67	94117.60	35903.67	278523.07	106250.05	295930.90	15
46	33819.05	94107.77	35936.51	278268.53	106261.15	295691.35	14
47	33846.42	94097.93	35969.36	278014.40	106272.27	295452.21	13
48	33873.79	94088.08	36002.22	277760.69	106283.39	295213.48	12
49	33901.16	94078.22	36035.08	277507.38	106294.53	294975.16	11
50	33928.53	94068.35	36067.95	277254.48	106305.68	294737.25	10
51	33955.89	94058.48	36100.83	277001.99	106316.84	294499.75	9
52	33983.25	94048.60	36133.71	276749.90	106328.01	294262.65	8
53	34010.60	94038.71	36166.60	276498.22	106339.19	294025.97	7
54	34037.95	94028.81	36199.50	276246.95	106350.38	293789.68	6
55	34065.30	94018.90	36232.40	275996.08	106361.58	293553.80	5
56	34092.65	94008.99	36265.31	275745.61	106372.80	293318.33	4
57	34120.00	93999.07	36298.23	275495.54	106384.03	293083.26	3
58	34147.34	93989.14	36331.15	275245.88	106395.27	292848.58	2
59	34174.68	93979.20	36364.08	274996.61	106406.52	292614.31	1
60	34202.02	93969.26	36397.02	274747.74	106417.78	292380.44	0

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20	Sinus		Tangens		Secans		
0	34202.02	93969.26	36397.02	274747.74	106417.78	292380.44	60
1	34229.35	93959.31	36429.97	274499.27	106429.05	292146.97	59
2	34256.68	93949.35	36462.92	274251.20	106440.33	291913.89	58
3	34284.01	93939.38	36495.88	274003.52	106451.63	291681.21	57
4	34311.33	93929.40	36528.85	273756.23	106462.94	291448.92	56
5	34338.65	93919.42	36561.82	273509.34	106474.26	291217.03	55
6	34365.97	93909.43	36594.80	273262.84	106485.59	290985.53	54
7	34393.29	93899.43	36627.79	273016.74	106496.93	290754.43	53
8	34420.60	93889.42	36660.79	272771.02	106508.28	290523.72	52
9	34447.91	93879.40	36693.79	272525.69	106519.64	290293.39	51
10	34475.22	93869.37	36726.80	272280.75	106531.01	290063.46	50
11	34502.52	93859.34	36759.82	272036.20	106542.40	289833.91	49
12	34529.82	93849.30	36792.84	271792.04	106553.80	289604.75	48
13	34557.12	93839.25	36825.87	271548.26	106565.21	289375.98	47
14	34584.42	93829.19	36858.91	271304.87	106576.63	289147.60	46
15	34611.71	93819.13	36891.95	271061.86	106588.07	288919.59	45
16	34639.00	93809.06	36925.00	270819.23	106599.51	288691.98	44
17	34666.29	93798.98	36958.06	270576.99	106610.97	288464.74	43
18	34693.57	93788.89	36991.13	270335.13	106622.43	288237.89	42
19	34720.85	93778.79	37024.20	270093.64	106633.91	288011.42	41
20	34748.13	93768.69	37057.28	269852.54	106645.40	287785.32	40
21	34775.40	93758.58	37090.37	269611.81	106656.90	287559.61	39
22	34802.67	93748.46	37123.46	269371.47	106668.42	287334.28	38
23	34829.94	93738.33	37156.56	269131.49	106679.94	287109.32	37
24	34857.21	93728.19	37189.67	268891.90	106691.48	286884.74	36
25	34884.47	93718.05	37222.78	268652.67	106703.02	286660.53	35
26	34911.73	93707.90	37255.90	268413.83	106714.58	286436.70	34
27	34938.99	93697.74	37289.03	268175.35	106726.15	286213.24	33
28	34966.24	93687.57	37322.17	267937.25	106737.74	285990.15	32
29	34993.49	93677.40	37355.32	267699.51	106749.34	285767.44	31
30	35020.74	93667.22	37388.47	267462.15	106760.94	285545.09	30

20	Sinus		Tangens		Secans		
30	35020.74	93667.22	37388.47	267462.15	106760.94	285545.09	30
31	35047.99	93657.03	37421.63	267225.16	106772.55	285323.12	29
32	35075.23	93646.83	37454.79	266988.53	106784.18	285101.52	28
33	35102.47	93636.62	37487.97	266752.27	106795.82	284880.28	27
34	35129.70	93626.40	37521.15	266516.38	106807.47	284659.41	26
35	35156.93	93616.18	37554.34	266280.85	106819.14	284438.91	25
36	35184.16	93605.95	37587.53	266045.69	106830.81	284218.77	24
37	35211.39	93595.71	37620.73	265810.89	106842.50	283998.99	23
38	35238.62	93585.46	37653.94	265576.45	106854.20	283779.58	22
39	35265.84	93575.21	37687.16	265342.38	106865.91	283560.54	21
40	35293.06	93564.95	37720.38	265108.67	106877.63	283341.85	20
41	35320.27	93554.68	37753.61	264875.31	106889.36	283123.53	19
42	35347.48	93544.40	37786.85	264642.32	106901.10	282905.56	18
43	35374.69	93534.11	37820.10	264409.69	106912.86	282687.96	17
44	35401.90	93523.82	37853.35	264177.41	106924.63	282470.71	16
45	35429.10	93513.52	37886.61	263945.49	106936.41	282253.82	15
46	35456.30	93503.21	37919.88	263713.92	106948.20	282037.29	14
47	35483.50	93492.89	37953.16	263482.71	106960.00	281821.11	13
48	35510.70	93482.56	37986.44	263251.86	106971.82	281605.29	12
49	35537.89	93472.23	38019.73	263021.36	106983.64	281389.82	11
50	35565.08	93461.89	38053.03	262791.21	106995.48	281174.71	10
51	35592.26	93451.54	38086.33	262561.41	107007.33	280959.95	9
52	35619.44	93441.18	38119.64	262331.96	107019.19	280745.54	8
53	35646.62	93430.82	38152.96	262102.86	107031.06	280531.48	7
54	35673.80	93420.45	38186.29	261874.11	107042.95	280317.77	6
55	35700.97	93410.07	38219.62	261645.71	107054.84	280104.41	5
56	35728.14	93399.68	38252.96	261417.66	107066.75	279891.40	4
57	35755.31	93389.28	38286.31	261189.95	107078.67	279678.73	3
58	35782.48	93378.87	38319.67	260962.59	107090.60	279466.41	2
59	35809.64	93368.46	38353.03	260735.58	107102.54	279254.44	1
60	35836.79	93358.04	38386.40	260508.91	107114.50	279042.81	0

21	Sinus		Tangens		Secans		
0	35836.79	93358.04	38386.40	260508.91	107114.50	279042.81	60
1	35863.95	93347.61	38419.78	260282.58	107126.47	278831.53	59
2	35891.10	93337.17	38453.17	260056.59	107138.44	278620.59	58
3	35918.25	93326.73	38486.56	259830.95	107150.43	278409.99	57
4	35945.40	93316.28	38519.96	259605.64	107162.44	278199.73	56
5	35972.54	93305.82	38553.37	259380.68	107174.45	277989.82	55
6	35999.68	93295.35	38586.79	259156.06	107186.47	277780.24	54
7	36026.82	93284.87	38620.21	258931.77	107198.51	277571.00	53
8	36053.95	93274.39	38653.64	258707.82	107210.56	277362.11	52
9	36081.08	93263.90	38687.08	258484.21	107222.62	277153.55	51
10	36108.21	93253.40	38720.53	258260.94	107234.69	276945.32	50
11	36135.33	93242.89	38753.98	258038.00	107246.78	276737.43	49
12	36162.46	93232.38	38787.44	257815.39	107258.87	276529.88	48
13	36189.58	93221.86	38820.91	257593.12	107270.98	276322.66	47
14	36216.69	93211.33	38854.39	257371.18	107283.10	276115.78	46
15	36243.80	93200.79	38887.87	257149.57	107295.23	275909.23	45
16	36270.91	93190.24	38921.36	256928.30	107307.37	275703.01	44
17	36298.02	93179.68	38954.86	256707.35	107319.53	275497.12	43
18	36325.12	93169.12	38988.37	256486.74	107331.70	275291.57	42
19	36352.22	93158.55	39021.89	256266.45	107343.88	275086.34	41
20	36379.32	93147.97	39055.41	256046.49	107356.07	274881.44	40
21	36406.41	93137.38	39088.94	255826.86	107368.27	274676.87	39
22	36433.50	93126.79	39122.48	255607.56	107380.48	274472.63	38
23	36460.59	93116.19	39156.02	255388.58	107392.71	274268.71	37
24	36487.68	93105.58	39189.57	255169.92	107404.95	274065.12	36
25	36514.76	93094.96	39223.13	254951.60	107417.20	273861.86	35
26	36541.84	93084.33	39256.70	254733.59	107429.46	273658.92	34
27	36568.92	93073.70	39290.28	254515.91	107441.73	273456.30	33
28	36595.99	93063.06	39323.86	254298.55	107454.02	273254.00	32
29	36623.06	93052.41	39357.45	254081.51	107466.31	273052.03	31
30	36650.13	93041.75	39391.05	253864.79	107478.62	272850.38	30

21	Sinus		Tangens		Secans		
30	36650.13	93041.75	39391.05	253864.79	107478.62	272850.38	30
31	36677.19	93031.09	39424.66	253648.39	107490.95	272649.05	29
32	36704.25	93020.42	39458.27	253432.31	107503.28	272448.04	28
33	36731.31	93009.74	39491.89	253216.55	107515.62	272247.35	27
34	36758.36	92999.05	39525.52	253001.11	107527.98	272046.98	26
35	36785.41	92988.35	39559.16	252785.98	107540.35	271846.93	25
36	36812.46	92977.65	39592.80	252571.17	107552.73	271647.19	24
37	36839.50	92966.94	39626.45	252356.67	107565.12	271447.77	23
38	36866.54	92956.22	39660.11	252142.49	107577.53	271248.66	22
39	36893.58	92945.49	39693.78	251928.63	107589.95	271049.87	21
40	36920.62	92934.75	39727.46	251715.07	107602.37	270851.39	20
41	36947.65	92924.01	39761.14	251501.83	107614.81	270653.23	19
42	36974.68	92913.26	39794.83	251288.90	107627.27	270455.38	18
43	37001.70	92902.50	39828.53	251076.29	107639.73	270257.84	17
44	37028.72	92891.73	39862.24	250863.98	107652.21	270060.61	16
45	37055.74	92880.95	39895.96	250651.98	107664.70	269863.70	15
46	37082.76	92870.17	39929.68	250440.29	107677.20	269667.09	14
47	37109.77	92859.38	39963.41	250228.91	107689.71	269470.79	13
48	37136.78	92848.58	39997.15	250017.84	107702.24	269274.80	12
49	37163.79	92837.77	40030.89	249807.07	107714.77	269079.12	11
50	37190.80	92826.96	40064.65	249596.61	107727.32	268883.74	10
51	37217.80	92816.14	40098.41	249386.45	107739.88	268688.67	9
52	37244.80	92805.31	40132.18	249176.60	107752.46	268493.91	8
53	37271.79	92794.47	40165.96	248967.06	107765.04	268299.45	7
54	37298.78	92783.62	40199.75	248757.81	107777.64	268105.30	6
55	37325.77	92772.77	40233.54	248548.87	107790.25	267911.45	5
56	37352.75	92761.91	40267.34	248340.23	107802.87	267717.90	4
57	37379.73	92751.04	40301.15	248131.90	107815.50	267524.65	3
58	37406.71	92740.16	40334.97	247923.86	107828.15	267331.70	2
59	37433.69	92729.28	40368.79	247716.12	107840.80	267139.06	1
60	37460.66	92718.39	40402.62	247508.69	107853.47	266946.72	0

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22	Sinus		Tangens		Secans		
0	37460.66	92718.39	40402.62	247508.69	107853.47	266946.72	60
1	37487.63	92707.49	40436.46	247301.55	107866.16	266754.67	59
2	37514.59	92696.58	40470.31	247094.70	107878.85	266562.92	58
3	37541.56	92685.66	40504.17	246888.16	107891.56	266371.48	57
4	37568.52	92674.73	40538.04	246681.91	107904.27	266180.33	56
5	37595.47	92663.80	40571.91	246475.96	107917.00	265989.47	55
6	37622.43	92652.86	40605.79	246270.30	107929.75	265798.91	54
7	37649.38	92641.91	40639.68	246064.94	107942.50	265608.65	53
8	37676.32	92630.96	40673.58	245859.87	107955.27	265418.68	52
9	37703.27	92620.00	40707.48	245655.09	107968.05	265229.01	51
10	37730.21	92609.03	40741.39	245450.61	107980.84	265039.62	50
11	37757.14	92598.05	40775.31	245246.42	107993.64	264850.54	49
12	37784.08	92587.06	40809.24	245042.52	108006.46	264661.74	48
13	37811.01	92576.06	40843.18	244838.91	108019.28	264473.23	47
14	37837.94	92565.06	40877.13	244635.59	108032.12	264285.02	46
15	37864.86	92554.05	40911.08	244432.56	108044.97	264097.09	45
16	37891.78	92543.03	40945.04	244229.82	108057.84	263909.46	44
17	37918.70	92532.00	40979.01	244027.36	108070.71	263722.11	43
18	37945.62	92520.97	41012.99	243825.19	108083.60	263535.05	42
19	37972.53	92509.93	41046.97	243623.31	108096.50	263348.28	41
20	37999.44	92498.88	41080.97	243421.72	108109.42	263161.80	40
21	38026.34	92487.82	41114.97	243220.41	108122.34	262975.60	39
22	38053.24	92476.75	41148.98	243019.38	108135.28	262789.69	38
23	38080.14	92465.68	41183.00	242818.64	108148.23	262604.06	37
24	38107.04	92454.60	41217.03	242618.19	108161.19	262418.72	36
25	38133.93	92443.51	41251.06	242418.01	108174.17	262233.66	35
26	38160.82	92432.41	41285.10	242218.12	108187.15	262048.88	34
27	38187.70	92421.31	41319.15	242018.51	108200.15	261864.39	33
28	38214.59	92410.20	41353.21	241819.18	108213.16	261680.18	32
29	38241.47	92399.08	41387.28	241620.13	108226.18	261496.24	31
30	38268.34	92387.95	41421.36	241421.36	108239.22	261312.59	30

22	Sinus		Tangens		Secans		
30	38268.34	92387.95	41421.36	241421.36	108239.22	261312.59	30
31	38295.22	92376.81	41455.44	241222.86	108252.27	261129.22	29
32	38322.09	92365.67	41489.53	241024.65	108265.33	260946.13	28
33	38348.95	92354.52	41523.63	240826.72	108278.40	260763.32	27
34	38375.82	92343.36	41557.74	240629.06	108291.49	260580.78	26
35	38402.68	92332.19	41591.86	240431.68	108304.58	260398.52	25
36	38429.53	92321.02	41625.99	240234.57	108317.69	260216.54	24
37	38456.39	92309.84	41660.12	240037.74	108330.81	260034.84	23
38	38483.24	92298.65	41694.26	239841.18	108343.95	259853.41	22
39	38510.08	92287.45	41728.41	239644.90	108357.09	259672.25	21
40	38536.93	92276.24	41762.57	239448.89	108370.25	259491.37	20
41	38563.77	92265.03	41796.74	239253.16	108383.42	259310.77	19
42	38590.60	92253.81	41830.91	239057.69	108396.61	259130.43	18
43	38617.44	92242.58	41865.09	238862.50	108409.80	258950.37	17
44	38644.27	92231.34	41899.28	238667.58	108423.01	258770.58	16
45	38671.10	92220.09	41933.48	238472.93	108436.23	258591.07	15
46	38697.92	92208.84	41967.69	238278.55	108449.47	258411.82	14
47	38724.74	92197.58	42001.91	238084.44	108462.71	258232.84	13
48	38751.56	92186.31	42036.13	237890.60	108475.97	258054.14	12
49	38778.37	92175.03	42070.36	237697.03	108489.24	257875.70	11
50	38805.18	92163.75	42104.60	237503.72	108502.52	257697.53	10
51	38831.99	92152.46	42138.85	237310.68	108515.82	257519.63	9
52	38858.80	92141.16	42173.11	237117.91	108529.13	257341.99	8
53	38885.60	92129.85	42207.38	236925.40	108542.45	257164.62	7
54	38912.39	92118.54	42241.66	236733.16	108555.78	256987.52	6
55	38939.19	92107.22	42275.94	236541.18	108569.12	256810.69	5
56	38965.98	92095.89	42310.23	236349.46	108582.48	256634.12	4
57	38992.77	92084.55	42344.53	236158.01	108595.85	256457.81	3
58	39019.55	92073.20	42378.84	235966.83	108609.24	256281.76	2
59	39046.33	92061.85	42413.16	235775.90	108622.63	256105.99	1
60	39073.11	92050.49	42447.49	235585.24	108636.04	255930.47	0

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23	Sinus		Tangens		Secans		
0	39073.11	92050.49	42447.49	235585.24	108636.04	255930.47	60
1	39099.89	92039.12	42481.82	235394.83	108649.46	255755.21	59
2	39126.66	92027.74	42516.16	235204.69	108662.89	255580.22	58
3	39153.43	92016.35	42550.51	235014.81	108676.34	255405.48	57
4	39180.19	92004.96	42584.87	234825.19	108689.79	255231.01	56
5	39206.95	91993.56	42619.24	234635.82	108703.26	255056.80	55
6	39233.71	91982.15	42653.62	234446.72	108716.75	254882.84	54
7	39260.47	91970.73	42688.00	234257.87	108730.24	254709.15	53
8	39287.22	91959.31	42722.39	234069.28	108743.75	254535.71	52
9	39313.97	91947.88	42756.79	233880.95	108757.27	254362.53	51
10	39340.71	91936.44	42791.20	233692.87	108770.80	254189.61	50
11	39367.45	91924.99	42825.62	233505.05	108784.35	254016.94	49
12	39394.19	91913.53	42860.05	233317.48	108797.91	253844.53	48
13	39420.93	91902.07	42894.49	233130.17	108811.48	253672.38	47
14	39447.66	91890.60	42928.94	232943.11	108825.06	253500.48	46
15	39474.39	91879.12	42963.39	232756.30	108838.66	253328.83	45
16	39501.11	91867.63	42997.85	232569.75	108852.27	253157.44	44
17	39527.83	91856.14	43032.32	232383.45	108865.89	252986.30	43
18	39554.55	91844.64	43066.80	232197.40	108879.52	252815.41	42
19	39581.27	91833.13	43101.29	232011.60	108893.17	252644.78	41
20	39607.98	91821.61	43135.79	231826.06	108906.83	252474.40	40
21	39634.69	91810.08	43170.30	231640.76	108920.50	252304.26	39
22	39661.39	91798.55	43204.81	231455.71	108934.18	252134.38	38
23	39688.09	91787.01	43239.33	231270.91	108947.88	251964.75	37
24	39714.79	91775.46	43273.86	231086.36	108961.59	251795.37	36
25	39741.48	91763.90	43308.40	230902.06	108975.31	251626.24	35
26	39768.17	91752.34	43342.95	230718.01	108989.04	251457.35	34
27	39794.86	91740.77	43377.51	230534.20	109002.79	251288.71	33
28	39821.55	91729.19	43412.08	230350.64	109016.55	251120.32	32
29	39848.23	91717.60	43446.66	230167.32	109030.32	250952.18	31
30	39874.91	91706.01	43481.24	229984.25	109044.11	250784.28	30

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23	Sinus		Tangens		Secans		
30	39874.91	91706.01	43481.24	229984.25	109044.11	250784.28	30
31	39901.58	91694.41	43515.83	229801.43	109057.91	250616.63	29
32	39928.25	91682.80	43550.43	229618.85	109071.72	250449.23	28
33	39954.92	91671.18	43585.04	229436.51	109085.54	250282.07	27
34	39981.58	91659.55	43619.66	229254.42	109099.38	250115.15	26
35	40008.24	91647.91	43654.29	229072.57	109113.23	249948.47	25
36	40034.90	91636.27	43688.93	228890.96	109127.09	249782.04	24
37	40061.56	91624.62	43723.58	228709.59	109140.97	249615.86	23
38	40088.21	91612.96	43758.23	228528.46	109154.86	249449.91	22
39	40114.86	91601.30	43792.89	228347.58	109168.76	249284.21	21
40	40141.50	91589.63	43827.56	228166.93	109182.67	249118.74	20
41	40168.14	91577.95	43862.24	227986.53	109196.59	248953.52	19
42	40194.78	91566.26	43896.93	227806.36	109210.53	248788.54	18
43	40221.41	91554.56	43931.63	227626.43	109224.48	248623.80	17
44	40248.04	91542.86	43966.34	227446.74	109238.45	248459.29	16
45	40274.67	91531.15	44001.06	227267.29	109252.43	248295.03	15
46	40301.29	91519.43	44035.78	227088.07	109266.42	248131.00	14
47	40327.91	91507.70	44070.51	226909.09	109280.42	247967.21	13
48	40354.53	91495.96	44105.25	226730.35	109294.44	247803.66	12
49	40381.14	91484.22	44140.00	226551.84	109308.47	247640.34	11
50	40407.75	91472.47	44174.76	226373.57	109322.51	247477.26	10
51	40434.36	91460.71	44209.53	226195.53	109336.56	247314.42	9
52	40460.96	91448.95	44244.31	226017.73	109350.63	247151.81	8
53	40487.56	91437.18	44279.10	225840.16	109364.71	246989.43	7
54	40514.16	91425.40	44313.90	225662.83	109378.80	246827.29	6
55	40540.75	91413.61	44348.71	225485.72	109392.91	246665.38	5
56	40567.34	91401.81	44383.53	225308.85	109407.03	246503.71	4
57	40593.93	91390.00	44418.35	225132.21	109421.16	246342.27	3
58	40620.51	91378.19	44453.18	224955.80	109435.30	246181.06	2
59	40647.09	91366.37	44488.02	224779.62	109449.46	246020.08	1
60	40673.66	91354.54	44522.87	224603.68	109463.63	245859.33	0

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24	Sinus		Tangens		Secans		
0	40673.66	91354.54	44522.87	224603.68	109463.63	245859.33	60
1	40700.23	91342.71	44557.73	224427.96	109477.81	245698.82	59
2	40726.80	91330.87	44592.60	224252.47	109492.01	245538.53	58
3	40753.37	91319.02	44627.48	224077.21	109506.22	245378.48	57
4	40779.93	91307.16	44662.37	223902.18	109520.44	245218.65	56
5	40806.49	91295.29	44697.27	223727.38	109534.67	245059.05	55
6	40833.05	91283.42	44732.17	223552.80	109548.92	244899.68	54
7	40859.60	91271.54	44767.08	223378.45	109563.18	244740.54	53
8	40886.15	91259.65	44802.00	223204.33	109577.46	244581.63	52
9	40912.69	91247.75	44836.93	223030.43	109591.74	244422.94	51
10	40939.23	91235.84	44871.87	222856.76	109606.04	244264.48	50
11	40965.77	91223.93	44906.82	222683.31	109620.36	244106.24	49
12	40992.30	91212.01	44941.78	222510.09	109634.68	243948.23	48
13	41018.83	91200.08	44976.75	222337.09	109649.02	243790.45	47
14	41045.36	91188.14	45011.73	222164.32	109663.37	243632.89	46
15	41071.89	91176.20	45046.72	221991.77	109677.74	243475.55	45
16	41098.41	91164.25	45081.72	221819.44	109692.12	243318.44	44
17	41124.93	91152.29	45116.73	221647.33	109706.51	243161.55	43
18	41151.44	91140.32	45151.74	221475.45	109720.91	243004.89	42
19	41177.95	91128.35	45186.76	221303.79	109735.33	242848.44	41
20	41204.46	91116.37	45221.79	221132.34	109749.76	242692.22	40
21	41230.96	91104.38	45256.83	220961.12	109764.20	242536.22	39
22	41257.46	91092.38	45291.88	220790.12	109778.66	242380.44	38
23	41283.95	91080.38	45326.94	220619.34	109793.13	242224.88	37
24	41310.44	91068.37	45362.01	220448.78	109807.61	242069.54	36
25	41336.93	91056.35	45397.09	220278.43	109822.11	241914.42	35
26	41363.42	91044.32	45432.18	220108.31	109836.62	241759.52	34
27	41389.90	91032.28	45467.28	219938.40	109851.14	241604.84	33
28	41416.38	91020.24	45502.39	219768.71	109865.68	241450.38	32
29	41442.85	91008.19	45537.51	219599.23	109880.23	241296.13	31
30	41469.32	90996.13	45572.64	219429.97	109894.79	241142.10	30

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24	Sinus		Tangens		Secans		
30	41469.32	90996.13	45572.64	219429.97	109894.79	241142.10	30
31	41495.79	90984.06	45607.77	219260.93	109909.36	240988.29	29
32	41522.26	90971.98	45642.91	219092.10	109923.95	240834.69	28
33	41548.72	90959.90	45678.06	218923.49	109938.55	240681.32	27
34	41575.18	90947.81	45713.22	218755.10	109953.17	240528.15	26
35	41601.63	90935.71	45748.39	218586.91	109967.79	240375.20	25
36	41628.08	90923.61	45783.57	218418.94	109982.43	240222.47	24
37	41654.53	90911.50	45818.76	218251.19	109997.09	240069.95	23
38	41680.97	90899.38	45853.96	218083.64	110011.76	239917.64	22
39	41707.41	90887.25	45889.17	217916.31	110026.44	239765.55	21
40	41733.85	90875.11	45924.39	217749.20	110041.13	239613.67	20
41	41760.28	90862.97	45959.62	217582.29	110055.84	239462.01	19
42	41786.71	90850.82	45994.86	217415.59	110070.56	239310.55	18
43	41813.13	90838.66	46030.11	217249.11	110085.29	239159.31	17
44	41839.55	90826.49	46065.37	217082.83	110100.04	239008.28	16
45	41865.97	90814.32	46100.64	216916.77	110114.80	238857.46	15
46	41892.39	90802.14	46135.91	216750.91	110129.57	238706.85	14
47	41918.80	90789.95	46171.19	216585.27	110144.36	238556.45	13
48	41945.21	90777.75	46206.48	216419.83	110159.16	238406.25	12
49	41971.61	90765.54	46241.78	216254.60	110173.97	238256.27	11
50	41998.01	90753.33	46277.09	216089.58	110188.79	238106.50	10
51	42024.41	90741.11	46312.42	215924.76	110203.63	237956.93	9
52	42050.80	90728.88	46347.76	215760.15	110218.49	237807.58	8
53	42077.19	90716.64	46383.11	215595.75	110233.35	237658.43	7
54	42103.58	90704.40	46418.46	215431.56	110248.23	237509.49	6
55	42129.96	90692.15	46453.82	215267.57	110263.13	237360.75	5
56	42156.34	90679.89	46489.19	215103.78	110278.03	237212.22	4
57	42182.72	90667.62	46524.57	214940.20	110292.95	237063.90	3
58	42209.09	90655.35	46559.96	214776.83	110307.89	236915.78	2
59	42235.46	90643.07	46595.36	214613.66	110322.83	236767.87	1
60	42261.83	90630.78	46630.77	214450.69	110337.79	236620.16	0

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25	Sinus		Tangens		Secans		
0	42261.83	90630.78	46630.77	214450.69	110337.79	236620.16	60
1	42288.19	90618.48	46666.19	214287.93	110352.77	236472.65	59
2	42314.55	90606.17	46701.62	214125.37	110367.75	236325.35	58
3	42340.90	90593.86	46737.06	213963.01	110382.75	236178.26	57
4	42367.25	90581.54	46772.51	213800.85	110397.77	236031.36	56
5	42393.60	90569.21	46807.97	213638.89	110412.79	235884.67	55
6	42419.94	90556.88	46843.43	213477.14	110427.83	235738.18	54
7	42446.28	90544.54	46878.90	213315.59	110442.89	235591.89	53
8	42472.62	90532.19	46914.38	213154.23	110457.95	235445.81	52
9	42498.95	90519.83	46949.88	212993.08	110473.03	235299.92	51
10	42525.28	90507.46	46985.39	212832.13	110488.13	235154.24	50
11	42551.61	90495.09	47020.90	212671.37	110503.24	235008.75	49
12	42577.93	90482.71	47056.43	212510.82	110518.36	234863.47	48
13	42604.25	90470.32	47091.96	212350.46	110533.49	234718.38	47
14	42630.56	90457.92	47127.51	212190.30	110548.64	234573.49	46
15	42656.87	90445.51	47163.06	212030.34	110563.80	234428.80	45
16	42683.18	90433.10	47198.63	211870.57	110578.98	234284.31	44
17	42709.49	90420.68	47234.20	211711.01	110594.17	234140.02	43
18	42735.79	90408.25	47269.78	211551.64	110609.37	233995.93	42
19	42762.09	90395.82	47305.38	211392.46	110624.58	233852.03	41
20	42788.38	90383.38	47340.98	211233.48	110639.81	233708.33	40
21	42814.67	90370.93	47376.59	211074.70	110655.06	233564.82	39
22	42840.95	90358.47	47412.22	210916.11	110670.31	233421.52	38
23	42867.23	90346.00	47447.85	210757.71	110685.58	233278.40	37
24	42893.51	90333.53	47483.49	210599.51	110700.87	233135.48	36
25	42919.79	90321.05	47519.14	210441.50	110716.16	232992.76	35
26	42946.06	90308.56	47554.81	210283.69	110731.47	232850.23	34
27	42972.33	90296.06	47590.48	210126.07	110746.80	232707.90	33
28	42998.59	90283.56	47626.16	209968.64	110762.14	232565.75	32
29	43024.85	90271.05	47661.85	209811.40	110777.49	232423.81	31
30	43051.11	90258.53	47697.55	209654.36	110792.85	232282.05	30

25	Sinus		Tangens		Secans		
30	43051.11	90258.53	47697.55	209654.36	110792.85	232282.05	30
31	43077.36	90246.00	47733.26	209497.51	110808.23	232140.49	29
32	43103.61	90233.47	47768.99	209340.84	110823.63	231999.11	28
33	43129.86	90220.93	47804.72	209184.37	110839.03	231857.94	27
34	43156.10	90208.38	47840.46	209028.09	110854.45	231716.95	26
35	43182.34	90195.82	47876.21	208872.00	110869.89	231576.15	25
36	43208.57	90183.25	47911.97	208716.10	110885.33	231435.54	24
37	43234.80	90170.68	47947.74	208560.39	110900.79	231295.13	23
38	43261.03	90158.10	47983.52	208404.86	110916.27	231154.90	22
39	43287.26	90145.51	48019.32	208249.53	110931.76	231014.86	21
40	43313.48	90132.91	48055.12	208094.38	110947.26	230875.01	20
41	43339.70	90120.31	48090.93	207939.42	110962.77	230735.35	19
42	43365.91	90107.70	48126.75	207784.65	110978.30	230595.88	18
43	43392.12	90095.08	48162.58	207630.07	110993.85	230456.60	17
44	43418.33	90082.45	48198.42	207475.67	111009.41	230317.51	16
45	43444.53	90069.82	48234.27	207321.46	111024.98	230178.60	15
46	43470.73	90057.18	48270.14	207167.43	111040.56	230039.88	14
47	43496.92	90044.53	48306.01	207013.59	111056.16	229901.34	13
48	43523.11	90031.87	48341.89	206859.93	111071.77	229762.99	12
49	43549.30	90019.21	48377.78	206706.46	111087.40	229624.83	11
50	43575.48	90006.54	48413.68	206553.18	111103.04	229486.85	10
51	43601.66	89993.86	48449.59	206400.08	111118.69	229349.06	9
52	43627.84	89981.17	48485.52	206247.16	111134.36	229211.45	8
53	43654.01	89968.48	48521.45	206094.42	111150.04	229074.03	7
54	43680.18	89955.78	48557.39	205941.87	111165.73	228936.79	6
55	43706.34	89943.07	48593.34	205789.50	111181.44	228799.74	5
56	43732.50	89930.35	48629.31	205637.32	111197.16	228662.86	4
57	43758.66	89917.62	48665.28	205485.31	111212.90	228526.18	3
58	43784.82	89904.89	48701.26	205333.49	111228.65	228389.67	2
59	43810.97	89892.15	48737.26	205181.84	111244.42	228253.34	1
60	43837.12	89879.40	48773.26	205030.38	111260.19	228117.20	0

26	Sinus		Tangens		Secans		
0	43837.12	89879.40	48773.26	205030.38	111260.19	228117.20	60
1	43863.26	89866.65	48809.27	204879.10	111275.98	227981.24	59
2	43889.40	89853.89	48845.30	204728.00	111291.79	227845.46	58
3	43915.53	89841.12	48881.33	204577.08	111307.61	227709.86	57
4	43941.66	89828.34	48917.37	204426.34	111323.45	227574.45	56
5	43967.79	89815.55	48953.43	204275.78	111339.30	227439.21	55
6	43993.92	89802.76	48989.49	204125.40	111355.16	227304.15	54
7	44020.04	89789.96	49025.57	203975.19	111371.03	227169.27	53
8	44046.16	89777.15	49061.66	203825.17	111386.92	227034.57	52
9	44072.27	89764.33	49097.75	203675.32	111402.82	226900.05	51
10	44098.38	89751.51	49133.86	203525.65	111418.74	226765.71	50
11	44124.48	89738.68	49169.97	203376.15	111434.67	226631.55	49
12	44150.58	89725.84	49206.10	203226.83	111450.62	226497.56	48
13	44176.68	89712.99	49242.24	203077.69	111466.58	226363.75	47
14	44202.78	89700.13	49278.38	202928.73	111482.55	226230.12	46
15	44228.87	89687.27	49314.54	202779.94	111498.54	226096.67	45
16	44254.96	89674.40	49350.71	202631.33	111514.54	225963.39	44
17	44281.04	89661.52	49386.89	202482.89	111530.56	225830.29	43
18	44307.12	89648.64	49423.08	202334.62	111546.59	225697.36	42
19	44333.20	89635.75	49459.28	202186.53	111562.63	225564.61	41
20	44359.27	89622.85	49495.49	202038.62	111578.69	225432.04	40
21	44385.34	89609.94	49531.71	201890.88	111594.76	225299.64	39
22	44411.40	89597.03	49567.94	201743.31	111610.84	225167.41	38
23	44437.46	89584.11	49604.18	201595.92	111626.94	225035.36	37
24	44463.52	89571.18	49640.43	201448.69	111643.06	224903.48	36
25	44489.57	89558.24	49676.69	201301.64	111659.19	224771.78	35
26	44515.62	89545.29	49712.97	201154.77	111675.33	224640.24	34
27	44541.67	89532.34	49749.25	201008.06	111691.49	224508.89	33
28	44567.71	89519.38	49785.54	200861.53	111707.66	224377.70	32
29	44593.75	89506.41	49821.85	200715.16	111723.84	224246.69	31
30	44619.78	89493.43	49858.16	200568.97	111740.04	224115.84	30

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26	Sinus		Tangens		Secans		
30	44619.78	89493.43	49858.16	200568.97	111740.04	224115.84	30
31	44645.81	89480.45	49894.49	200422.95	111756.25	223985.17	29
32	44671.84	89467.46	49930.82	200277.10	111772.48	223854.67	28
33	44697.86	89454.46	49967.17	200131.42	111788.72	223724.35	27
34	44723.88	89441.45	50003.52	199985.90	111804.98	223594.19	26
35	44749.90	89428.44	50039.89	199840.56	111821.25	223464.20	25
36	44775.91	89415.42	50076.27	199695.39	111837.53	223334.38	24
37	44801.92	89402.39	50112.66	199550.38	111853.83	223204.74	23
38	44827.92	89389.36	50149.06	199405.54	111870.14	223075.26	22
39	44853.92	89376.32	50185.47	199260.87	111886.47	222945.95	21
40	44879.92	89363.27	50221.89	199116.37	111902.81	222816.81	20
41	44905.91	89350.21	50258.32	198972.04	111919.16	222687.83	19
42	44931.90	89337.14	50294.76	198827.87	111935.53	222559.03	18
43	44957.89	89324.06	50331.21	198683.87	111951.91	222430.39	17
44	44983.87	89310.98	50367.67	198540.03	111968.31	222301.92	16
45	45009.85	89297.89	50404.15	198396.36	111984.72	222173.62	15
46	45035.82	89284.79	50440.63	198252.86	112001.15	222045.48	14
47	45061.79	89271.69	50477.13	198109.52	112017.59	221917.51	13
48	45087.76	89258.58	50513.63	197966.35	112034.05	221789.71	12
49	45113.72	89245.46	50550.15	197823.34	112050.52	221662.07	11
50	45139.68	89232.33	50586.68	197680.50	112067.00	221534.60	10
51	45165.63	89219.20	50623.22	197537.82	112083.50	221407.30	9
52	45191.58	89206.06	50659.77	197395.31	112100.01	221280.16	8
53	45217.53	89192.91	50696.33	197252.96	112116.53	221153.18	7
54	45243.47	89179.75	50732.90	197110.77	112133.07	221026.37	6
55	45269.41	89166.59	50769.48	196968.74	112149.63	220899.72	5
56	45295.35	89153.42	50806.07	196826.88	112166.20	220773.23	4
57	45321.28	89140.24	50842.67	196685.18	112182.78	220646.91	3
58	45347.21	89127.05	50879.28	196543.64	112199.38	220520.75	2
59	45373.13	89113.85	50915.91	196402.27	112216.00	220394.76	1
60	45399.05	89100.65	50952.54	196261.05	112232.62	220268.93	0

27	Sinus		Tangens		Secans		
0	45399.05	89100.65	50952.54	196261.05	112232.62	220268.93	60
1	45424.97	89087.44	50989.19	196120.00	112249.26	220143.26	59
2	45450.88	89074.22	51025.85	195979.10	112265.92	220017.75	58
3	45476.79	89061.00	51062.52	195838.37	112282.59	219892.40	57
4	45502.69	89047.77	51099.19	195697.80	112299.28	219767.21	56
5	45528.59	89034.53	51135.88	195557.39	112315.98	219642.19	55
6	45554.49	89021.28	51172.59	195417.13	112332.69	219517.33	54
7	45580.38	89008.02	51209.30	195277.04	112349.42	219392.62	53
8	45606.27	88994.76	51246.02	195137.11	112366.16	219268.08	52
9	45632.16	88981.49	51282.75	194997.33	112382.92	219143.70	51
10	45658.04	88968.21	51319.50	194857.71	112399.69	219019.47	50
11	45683.92	88954.93	51356.25	194718.26	112416.48	218895.41	49
12	45709.79	88941.64	51393.02	194578.96	112433.28	218771.50	48
13	45735.66	88928.34	51429.80	194439.81	112450.10	218647.75	47
14	45761.53	88915.03	51466.58	194300.83	112466.93	218524.17	46
15	45787.39	88901.71	51503.38	194162.00	112483.77	218400.74	45
16	45813.25	88888.39	51540.19	194023.33	112500.63	218277.46	44
17	45839.10	88875.06	51577.02	193884.81	112517.50	218154.35	43
18	45864.95	88861.72	51613.85	193746.45	112534.39	218031.39	42
19	45890.80	88848.37	51650.69	193608.25	112551.29	217908.59	41
20	45916.64	88835.02	51687.55	193470.20	112568.21	217785.94	40
21	45942.48	88821.66	51724.41	193332.31	112585.14	217663.46	39
22	45968.32	88808.29	51761.29	193194.57	112602.09	217541.12	38
23	45994.15	88794.92	51798.18	193056.98	112619.05	217418.95	37
24	46019.98	88781.54	51835.08	192919.56	112636.03	217296.93	36
25	46045.80	88768.15	51871.99	192782.28	112653.02	217175.06	35
26	46071.62	88754.75	51908.91	192645.16	112670.03	217053.35	34
27	46097.44	88741.34	51945.84	192508.19	112687.05	216931.80	33
28	46123.25	88727.93	51982.78	192371.38	112704.08	216810.40	32
29	46149.06	88714.51	52019.74	192234.72	112721.13	216689.15	31
30	46174.86	88701.08	52056.70	192098.21	112738.19	216568.06	30

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27	Sinus		Tangens		Secans		
30	46174.86	88701.08	52056.70	192098.21	112738.19	216568.06	30
31	46200.66	88687.64	52093.68	191961.86	112755.27	216447.12	29
32	46226.46	88674.20	52130.67	191825.65	112772.37	216326.33	28
33	46252.25	88660.75	52167.67	191689.60	112789.48	216205.70	27
34	46278.04	88647.29	52204.68	191553.70	112806.60	216085.22	26
35	46303.82	88633.83	52241.70	191417.95	112823.74	215964.89	25
36	46329.60	88620.36	52278.74	191282.36	112840.89	215844.71	24
37	46355.38	88606.88	52315.78	191146.91	112858.06	215724.69	23
38	46381.15	88593.39	52352.84	191011.62	112875.24	215604.82	22
39	46406.92	88579.89	52389.90	190876.47	112892.44	215485.10	21
40	46432.69	88566.39	52426.98	190741.47	112909.65	215365.53	20
41	46458.45	88552.88	52464.07	190606.63	112926.88	215246.11	19
42	46484.21	88539.36	52501.17	190471.93	112944.12	215126.84	18
43	46509.96	88525.83	52538.29	190337.38	112961.37	215007.72	17
44	46535.71	88512.30	52575.41	190202.99	112978.64	214888.75	16
45	46561.45	88498.76	52612.54	190068.74	112995.93	214769.93	15
46	46587.19	88485.21	52649.69	189934.64	113013.23	214651.27	14
47	46612.93	88471.66	52686.85	189800.68	113030.55	214532.75	13
48	46638.66	88458.10	52724.02	189666.88	113047.88	214414.37	12
49	46664.39	88444.53	52761.20	189533.22	113065.22	214296.15	11
50	46690.12	88430.95	52798.39	189399.71	113082.58	214178.08	10
51	46715.84	88417.36	52835.59	189266.34	113099.96	214060.15	9
52	46741.56	88403.77	52872.81	189133.13	113117.35	213942.38	8
53	46767.27	88390.17	52910.04	189000.06	113134.75	213824.75	7
54	46792.98	88376.56	52947.27	188867.13	113152.17	213707.26	6
55	46818.69	88362.94	52984.52	188734.36	113169.61	213589.93	5
56	46844.39	88349.32	53021.78	188601.72	113187.06	213472.74	4
57	46870.09	88335.69	53059.06	188469.24	113204.52	213355.70	3
58	46895.78	88322.05	53096.34	188336.90	113222.00	213238.80	2
59	46921.47	88308.41	53133.64	188204.70	113239.50	213122.05	1
60	46947.16	88294.76	53170.94	188072.65	113257.01	213005.45	0

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28	Sinus		Tangens		Secans		
0	46947.16	88294.76	53170.94	188072.65	113257.01	213005.45	60
1	46972.84	88281.10	53208.26	187940.74	113274.53	212888.99	59
2	46998.52	88267.43	53245.59	187808.98	113292.07	212772.67	58
3	47024.19	88253.75	53282.93	187677.36	113309.62	212656.51	57
4	47049.86	88240.07	53320.29	187545.88	113327.19	212540.48	56
5	47075.53	88226.38	53357.65	187414.55	113344.78	212424.60	55
6	47101.19	88212.68	53395.03	187283.36	113362.38	212308.87	54
7	47126.85	88198.98	53432.42	187152.31	113379.99	212193.28	53
8	47152.50	88185.27	53469.82	187021.41	113397.62	212077.83	52
9	47178.15	88171.55	53507.23	186890.64	113415.27	211962.53	51
10	47203.80	88157.82	53544.65	186760.03	113432.93	211847.37	50
11	47229.44	88144.09	53582.08	186629.55	113450.60	211732.35	49
12	47255.08	88130.35	53619.53	186499.21	113468.29	211617.48	48
13	47280.71	88116.60	53656.99	186369.02	113486.00	211502.74	47
14	47306.34	88102.84	53694.46	186238.96	113503.72	211388.15	46
15	47331.97	88089.07	53731.94	186109.05	113521.46	211273.71	45
16	47357.59	88075.30	53769.43	185979.28	113539.21	211159.40	44
17	47383.21	88061.52	53806.94	185849.65	113556.98	211045.23	43
18	47408.82	88047.73	53844.45	185720.15	113574.76	210931.21	42
19	47434.43	88033.94	53881.98	185590.80	113592.55	210817.33	41
20	47460.04	88020.14	53919.52	185461.59	113610.36	210703.59	40
21	47485.64	88006.33	53957.07	185332.52	113628.19	210589.98	39
22	47511.24	87992.51	53994.64	185203.58	113646.03	210476.52	38
23	47536.83	87978.69	54032.21	185074.79	113663.89	210363.20	37
24	47562.42	87964.86	54069.80	184946.13	113681.76	210250.02	36
25	47588.01	87951.02	54107.40	184817.61	113699.65	210136.98	35
26	47613.59	87937.17	54145.01	184689.23	113717.55	210024.08	34
27	47639.17	87923.32	54182.63	184560.99	113735.47	209911.31	33
28	47664.74	87909.46	54220.27	184432.89	113753.40	209798.69	32
29	47690.31	87895.59	54257.91	184304.92	113771.35	209686.20	31
30	47715.88	87881.71	54295.57	184177.09	113789.32	209573.85	30

28	Sinus		Tangens		Secans		
30	47715.88	87881.71	54295.57	184177.09	113789.32	209573.85	30
31	47741.44	87867.83	54333.24	184049.39	113807.30	209461.64	29
32	47767.00	87853.94	54370.92	183921.84	113825.29	209349.57	28
33	47792.55	87840.04	54408.62	183794.42	113843.30	209237.64	27
34	47818.10	87826.13	54446.32	183667.13	113861.33	209125.84	26
35	47843.64	87812.22	54484.04	183539.99	113879.37	209014.18	25
36	47869.18	87798.30	54521.77	183412.97	113897.43	208902.65	24
37	47894.72	87784.37	54559.51	183286.10	113915.50	208791.27	23
38	47920.26	87770.43	54597.26	183159.36	113933.59	208680.02	22
39	47945.79	87756.49	54635.03	183032.75	113951.69	208568.90	21
40	47971.31	87742.54	54672.81	182906.28	113969.81	208457.92	20
41	47996.83	87728.58	54710.60	182779.94	113987.94	208347.08	19
42	48022.35	87714.61	54748.40	182653.74	114006.09	208236.37	18
43	48047.86	87700.64	54786.21	182527.67	114024.25	208125.80	17
44	48073.37	87686.66	54824.04	182401.73	114042.43	208015.36	16
45	48098.88	87672.67	54861.88	182275.93	114060.62	207905.06	15
46	48124.38	87658.68	54899.73	182150.26	114078.83	207794.89	14
47	48149.88	87644.68	54937.59	182024.73	114097.06	207684.86	13
48	48175.37	87630.67	54975.46	181899.32	114115.30	207574.96	12
49	48200.86	87616.65	55013.35	181774.05	114133.56	207465.19	11
50	48226.34	87602.62	55051.25	181648.92	114151.83	207355.56	10
51	48251.82	87588.59	55089.16	181523.91	114170.12	207246.06	9
52	48277.30	87574.55	55127.08	181399.04	114188.42	207136.70	8
53	48302.77	87560.50	55165.02	181274.30	114206.74	207027.46	7
54	48328.24	87546.45	55202.97	181149.69	114225.07	206918.36	6
55	48353.70	87532.39	55240.93	181025.21	114243.42	206809.40	5
56	48379.16	87518.32	55278.90	180900.86	114261.79	206700.56	4
57	48404.62	87504.24	55316.88	180776.64	114280.17	206591.86	3
58	48430.07	87490.16	55354.88	180652.56	114298.57	206483.28	2
59	48455.52	87476.07	55392.88	180528.60	114316.98	206374.84	1
60	48480.96	87461.97	55430.90	180404.78	114335.41	206266.53	0

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29	Sinus		Tangens		Secans		
0	48480.96	87461.97	55430.90	180404.78	114335.41	206266.53	60
1	48506.40	87447.86	55468.94	180281.08	114353.85	206158.36	59
2	48531.84	87433.75	55506.98	180157.51	114372.31	206050.31	58
3	48557.27	87419.63	55545.04	180034.08	114390.78	205942.39	57
4	48582.70	87405.50	55583.11	179910.77	114409.27	205834.60	56
5	48608.12	87391.36	55621.19	179787.59	114427.78	205726.95	55
6	48633.54	87377.22	55659.29	179664.54	114446.30	205619.42	54
7	48658.95	87363.07	55697.39	179541.62	114464.84	205512.03	53
8	48684.36	87348.91	55735.51	179418.83	114483.39	205404.76	52
9	48709.77	87334.75	55773.64	179296.16	114501.96	205297.62	51
10	48735.17	87320.58	55811.79	179173.62	114520.55	205190.61	50
11	48760.57	87306.40	55849.94	179051.21	114539.15	205083.73	49
12	48785.97	87292.21	55888.11	178928.93	114557.76	204976.98	48
13	48811.36	87278.01	55926.29	178806.78	114576.39	204870.36	47
14	48836.74	87263.81	55964.48	178684.75	114595.04	204763.86	46
15	48862.12	87249.60	56002.69	178562.85	114613.70	204657.50	45
16	48887.50	87235.38	56040.91	178441.07	114632.38	204551.26	44
17	48912.87	87221.16	56079.14	178319.43	114651.08	204445.15	43
18	48938.24	87206.93	56117.38	178197.90	114669.79	204339.16	42
19	48963.61	87192.69	56155.64	178076.51	114688.52	204233.30	41
20	48988.97	87178.44	56193.91	177955.24	114707.26	204127.57	40
21	49014.33	87164.19	56232.19	177834.09	114726.02	204021.97	39
22	49039.68	87149.93	56270.48	177713.07	114744.79	203916.49	38
23	49065.03	87135.66	56308.79	177592.18	114763.58	203811.14	37
24	49090.37	87121.38	56347.10	177471.41	114782.39	203705.92	36
25	49115.71	87107.10	56385.43	177350.76	114801.21	203600.82	35
26	49141.05	87092.81	56423.78	177230.24	114820.05	203495.85	34
27	49166.38	87078.51	56462.13	177109.85	114838.90	203391.00	33
28	49191.71	87064.20	56500.50	176989.58	114857.77	203286.27	32
29	49217.04	87049.89	56538.88	176869.43	114876.65	203181.68	31
30	49242.36	87035.57	56577.28	176749.40	114895.55	203077.20	30
							60

29	Sinus		Tangens		Secans		
30	49242.36	87035.57	56577.28	176749.40	114895.55	203077.20	30
31	49267.67	87021.24	56615.68	176629.50	114914.47	202972.86	29
32	49292.98	87006.90	56654.10	176509.72	114933.40	202868.63	28
33	49318.29	86992.56	56692.53	176390.07	114952.35	202764.53	27
34	49343.59	86978.21	56730.98	176270.53	114971.32	202660.56	26
35	49368.89	86963.85	56769.44	176151.12	114990.30	202556.70	25
36	49394.19	86949.49	56807.91	176031.83	115009.30	202452.97	24
37	49419.48	86935.12	56846.39	175912.67	115028.31	202349.37	23
38	49444.77	86920.74	56884.88	175793.62	115047.34	202245.89	22
39	49470.05	86906.35	56923.39	175674.70	115066.38	202142.53	21
40	49495.33	86891.96	56961.91	175555.90	115085.44	202039.29	20
41	49520.60	86877.56	57000.45	175437.22	115104.52	201936.17	19
42	49545.87	86863.15	57038.99	175318.66	115123.61	201833.18	18
43	49571.13	86848.73	57077.55	175200.23	115142.72	201730.31	17
44	49596.39	86834.31	57116.12	175081.91	115161.85	201627.56	16
45	49621.65	86819.88	57154.71	174963.71	115180.99	201524.94	15
46	49646.90	86805.44	57193.31	174845.64	115200.15	201422.43	14
47	49672.15	86791.00	57231.92	174727.68	115219.32	201320.05	13
48	49697.40	86776.55	57270.54	174609.84	115238.51	201217.79	12
49	49722.64	86762.09	57309.18	174492.13	115257.72	201115.64	11
50	49747.87	86747.62	57347.83	174374.53	115276.94	201013.62	10
51	49773.10	86733.14	57386.49	174257.05	115296.18	200911.72	9
52	49798.33	86718.66	57425.16	174139.69	115315.43	200809.94	8
53	49823.55	86704.17	57463.85	174022.45	115334.70	200708.28	7
54	49848.77	86689.67	57502.55	173905.33	115353.99	200606.74	6
55	49873.99	86675.17	57541.26	173788.33	115373.29	200505.32	5
56	49899.20	86660.66	57579.99	173671.44	115392.61	200404.02	4
57	49924.41	86646.14	57618.73	173554.68	115411.95	200302.83	3
58	49949.61	86631.61	57657.48	173438.03	115431.30	200201.77	2
59	49974.81	86617.08	57696.25	173321.49	115450.67	200100.83	1
60	50000.00	86602.54	57735.03	173205.08	115470.05	200000.00	0

30	Sinus		Tangens		Secans		
0	50000.00	86602.54	57735.03	173205.08	115470.05	200000.00	60
1	50025.19	86587.99	57773.82	173088.78	115489.45	199899.29	59
2	50050.38	86573.43	57812.62	172972.60	115508.87	199798.70	58
3	50075.56	86558.87	57851.44	172856.54	115528.30	199698.23	57
4	50100.74	86544.30	57890.27	172740.60	115547.75	199597.88	56
5	50125.91	86529.72	57929.11	172624.77	115567.22	199497.64	55
6	50151.08	86515.14	57967.97	172509.05	115586.70	199397.53	54
7	50176.24	86500.55	58006.84	172393.45	115606.20	199297.52	53
8	50201.40	86485.95	58045.73	172277.97	115625.72	199197.64	52
9	50226.55	86471.34	58084.62	172162.61	115645.25	199097.87	51
10	50251.70	86456.73	58123.53	172047.36	115664.80	198998.22	50
11	50276.85	86442.11	58162.45	171932.22	115684.36	198898.69	49
12	50301.99	86427.48	58201.39	171817.20	115703.94	198799.27	48
13	50327.13	86412.84	58240.34	171702.30	115723.54	198699.97	47
14	50352.27	86398.20	58279.30	171587.51	115743.15	198600.80	46
15	50377.40	86383.55	58318.28	171472.83	115762.78	198501.72	45
16	50402.53	86368.89	58357.27	171358.27	115782.43	198402.76	44
17	50427.65	86354.23	58396.27	171243.82	115802.09	198303.93	43
18	50452.77	86339.56	58435.28	171129.49	115821.77	198205.20	42
19	50477.88	86324.88	58474.31	171015.27	115841.47	198106.59	41
20	50502.99	86310.19	58513.35	170901.16	115861.18	198008.10	40
21	50528.09	86295.49	58552.41	170787.17	115880.91	197909.72	39
22	50553.19	86280.79	58591.48	170673.29	115900.65	197811.46	38
23	50578.28	86266.08	58630.56	170559.53	115920.41	197713.31	37
24	50603.37	86251.36	58669.65	170445.87	115940.19	197615.27	36
25	50628.46	86236.64	58708.76	170332.33	115959.99	197517.35	35
26	50653.55	86221.91	58747.88	170218.90	115979.80	197419.54	34
27	50678.63	86207.17	58787.02	170105.59	115999.63	197321.85	33
28	50703.70	86192.43	58826.17	169992.38	116019.47	197224.26	32
29	50728.77	86177.68	58865.33	169879.29	116039.33	197126.80	31
30	50753.84	86162.92	58904.50	169766.31	116059.21	197029.44	30

30	Sinus		Tangens		Secans		
30	50753.84	86162.92	58904.50	169766.31	116059.21	197029.44	30
31	50778.90	86148.15	58943.69	169653.44	116079.11	196932.20	29
32	50803.96	86133.37	58982.89	169540.69	116099.02	196835.07	28
33	50829.01	86118.59	59022.11	169428.04	116118.95	196738.05	27
34	50854.06	86103.80	59061.34	169315.50	116138.89	196641.14	26
35	50879.10	86089.00	59100.58	169203.08	116158.85	196544.34	25
36	50904.14	86074.20	59139.83	169090.77	116178.83	196447.67	24
37	50929.18	86059.39	59179.10	168978.56	116198.82	196351.10	23
38	50954.21	86044.57	59218.39	168866.47	116218.83	196254.64	22
39	50979.24	86029.74	59257.68	168754.49	116238.86	196158.29	21
40	51004.26	86014.91	59296.99	168642.61	116258.91	196062.06	20
41	51029.28	86000.07	59336.32	168530.85	116278.97	195965.93	19
42	51054.29	85985.22	59375.66	168419.19	116299.05	195869.92	18
43	51079.30	85970.37	59415.01	168307.65	116319.14	195774.01	17
44	51104.31	85955.51	59454.37	168196.21	116339.25	195678.22	16
45	51129.31	85940.64	59493.75	168084.89	116359.38	195582.54	15
46	51154.31	85925.76	59533.14	167973.67	116379.53	195486.97	14
47	51179.30	85910.88	59572.54	167862.56	116399.69	195391.50	13
48	51204.29	85895.99	59611.96	167751.56	116419.87	195296.15	12
49	51229.27	85881.09	59651.40	167640.67	116440.07	195200.91	11
50	51254.25	85866.18	59690.84	167529.88	116460.28	195105.77	10
51	51279.22	85851.27	59730.30	167419.21	116480.51	195010.75	9
52	51304.19	85836.35	59769.78	167308.64	116500.76	194915.83	8
53	51329.16	85821.42	59809.27	167198.18	116521.02	194821.02	7
54	51354.12	85806.49	59848.77	167087.82	116541.30	194726.32	6
55	51379.08	85791.55	59888.28	166977.58	116561.60	194631.73	5
56	51404.04	85776.60	59927.81	166867.44	116581.91	194537.25	4
57	51428.99	85761.64	59967.35	166757.41	116602.24	194442.88	3
58	51453.93	85746.68	60006.91	166647.48	116622.59	194348.61	2
59	51478.87	85731.71	60046.48	166537.66	116642.96	194254.45	1
60	51503.81	85716.73	60086.06	166427.95	116663.34	194160.40	0

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31	Sinus		Tangens		Secans		
0	51503.81	85716.73	60086.06	166427.95	116663.34	194160.40	60
1	51528.74	85701.74	60125.66	166318.34	116683.74	194066.46	59
2	51553.67	85686.75	60165.27	166208.84	116704.16	193972.62	58
3	51578.59	85671.75	60204.90	166099.45	116724.59	193878.89	57
4	51603.51	85656.74	60244.54	165990.16	116745.04	193785.27	56
5	51628.42	85641.73	60284.19	165880.97	116765.51	193691.76	55
6	51653.33	85626.71	60323.86	165771.89	116785.99	193598.35	54
7	51678.24	85611.68	60363.54	165662.92	116806.49	193505.05	53
8	51703.14	85596.64	60403.23	165554.05	116827.01	193411.85	52
9	51728.04	85581.60	60442.94	165445.29	116847.55	193318.76	51
10	51752.93	85566.55	60482.66	165336.63	116868.10	193225.78	50
11	51777.82	85551.49	60522.40	165228.08	116888.67	193132.90	49
12	51802.70	85536.42	60562.15	165119.63	116909.26	193040.13	48
13	51827.58	85521.35	60601.92	165011.28	116929.86	192947.46	47
14	51852.46	85506.27	60641.70	164903.04	116950.48	192854.90	46
15	51877.33	85491.18	60681.49	164794.90	116971.12	192762.44	45
16	51902.19	85476.09	60721.30	164686.86	116991.78	192670.09	44
17	51927.05	85460.99	60761.12	164578.93	117012.45	192577.84	43
18	51951.91	85445.88	60800.95	164471.11	117033.14	192485.70	42
19	51976.76	85430.76	60840.80	164363.38	117053.85	192393.66	41
20	52001.61	85415.64	60880.67	164255.76	117074.57	192301.73	40
21	52026.46	85400.51	60920.54	164148.24	117095.31	192209.90	39
22	52051.30	85385.37	60960.43	164040.82	117116.07	192118.17	38
23	52076.13	85370.23	61000.34	163933.51	117136.85	192026.55	37
24	52100.96	85355.08	61040.26	163826.30	117157.64	191935.03	36
25	52125.79	85339.92	61080.19	163719.19	117178.45	191843.62	35
26	52150.61	85324.75	61120.14	163612.18	117199.28	191752.30	34
27	52175.43	85309.58	61160.11	163505.28	117220.13	191661.09	33
28	52200.24	85294.40	61200.08	163398.47	117240.99	191569.99	32
29	52225.05	85279.21	61240.07	163291.77	117261.87	191478.99	31
30	52249.86	85264.02	61280.08	163185.17	117282.77	191388.09	30

31	Sinus		Tangens		Secans		
30	52249.86	85264.02	61280.08	163185.17	117282.77	191388.09	30
31	52274.66	85248.81	61320.10	163078.67	117303.69	191297.29	29
32	52299.45	85233.60	61360.13	162972.27	117324.62	191206.59	28
33	52324.24	85218.38	61400.18	162865.97	117345.57	191116.00	27
34	52349.03	85203.16	61440.24	162759.77	117366.54	191025.51	26
35	52373.81	85187.93	61480.32	162653.68	117387.52	190935.12	25
36	52398.59	85172.69	61520.41	162547.68	117408.52	190844.83	24
37	52423.36	85157.44	61560.52	162441.78	117429.54	190754.64	23
38	52448.13	85142.19	61600.64	162335.99	117450.58	190664.56	22
39	52472.90	85126.93	61640.77	162230.29	117471.64	190574.57	21
40	52497.66	85111.66	61680.92	162124.69	117492.71	190484.69	20
41	52522.41	85096.39	61721.08	162019.20	117513.80	190394.91	19
42	52547.16	85081.11	61761.26	161913.80	117534.91	190305.22	18
43	52571.91	85065.82	61801.45	161808.50	117556.03	190215.64	17
44	52596.65	85050.52	61841.66	161703.30	117577.17	190126.16	16
45	52621.39	85035.22	61881.88	161598.20	117598.33	190036.78	15
46	52646.12	85019.91	61922.11	161493.20	117619.51	189947.50	14
47	52670.85	85004.59	61962.36	161388.29	117640.70	189858.32	13
48	52695.58	84989.27	62002.63	161283.49	117661.91	189769.24	12
49	52720.30	84973.94	62042.91	161178.78	117683.14	189680.26	11
50	52745.02	84958.60	62083.20	161074.17	117704.39	189591.38	10
51	52769.73	84943.25	62123.51	160969.66	117725.66	189502.59	9
52	52794.44	84927.90	62163.83	160865.25	117746.94	189413.91	8
53	52819.14	84912.54	62204.17	160760.94	117768.24	189325.32	7
54	52843.84	84897.17	62244.52	160656.72	117789.56	189236.84	6
55	52868.53	84881.79	62284.88	160552.60	117810.90	189148.45	5
56	52893.22	84866.41	62325.26	160448.58	117832.25	189060.16	4
57	52917.90	84851.02	62365.66	160344.65	117853.62	188971.97	3
58	52942.58	84835.62	62406.07	160240.82	117875.01	188883.88	2
59	52967.26	84820.22	62446.50	160137.09	117896.42	188795.89	1
60	52991.93	84804.81	62486.94	160033.45	117917.84	188707.99	0

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32	Sinus		Tangens		Secans		
0	52991.93	84804.81	62486.94	160033.45	117917.84	188707.99	60
1	53016.59	84789.39	62527.39	159929.91	117939.28	188620.19	59
2	53041.25	84773.96	62567.86	159826.47	117960.74	188532.49	58
3	53065.91	84758.53	62608.34	159723.12	117982.22	188444.89	57
4	53090.56	84743.09	62648.84	159619.87	118003.72	188357.38	56
5	53115.21	84727.64	62689.35	159516.72	118025.23	188269.97	55
6	53139.86	84712.19	62729.88	159413.66	118046.76	188182.66	54
7	53164.50	84696.73	62770.42	159310.70	118068.31	188095.45	53
8	53189.13	84681.26	62810.98	159207.83	118089.88	188008.33	52
9	53213.76	84665.78	62851.56	159105.05	118111.47	187921.31	51
10	53238.39	84650.30	62892.15	159002.38	118133.07	187834.38	50
11	53263.01	84634.81	62932.75	158899.79	118154.69	187747.55	49
12	53287.63	84619.31	62973.36	158797.30	118176.33	187660.82	48
13	53312.24	84603.81	63013.99	158694.91	118197.99	187574.18	47
14	53336.85	84588.30	63054.64	158592.61	118219.66	187487.64	46
15	53361.45	84572.78	63095.30	158490.41	118241.35	187401.20	45
16	53386.05	84557.25	63135.98	158388.30	118263.06	187314.85	44
17	53410.64	84541.72	63176.67	158286.28	118284.79	187228.59	43
18	53435.23	84526.18	63217.38	158184.36	118306.54	187142.43	42
19	53459.82	84510.63	63258.10	158082.53	118328.30	187056.37	41
20	53484.40	84495.08	63298.83	157980.79	118350.08	186970.40	40
21	53508.98	84479.52	63339.58	157879.15	118371.88	186884.53	39
22	53533.55	84463.95	63380.35	157777.60	118393.70	186798.75	38
23	53558.12	84448.37	63421.13	157676.15	118415.54	186713.06	37
24	53582.68	84432.79	63461.93	157574.79	118437.40	186627.47	36
25	53607.24	84417.20	63502.74	157473.52	118459.27	186541.97	35
26	53631.79	84401.60	63543.57	157372.34	118481.16	186456.57	34
27	53656.34	84386.00	63584.41	157271.26	118503.07	186371.26	33
28	53680.88	84370.39	63625.27	157170.26	118525.00	186286.05	32
29	53705.42	84354.77	63666.14	157069.36	118546.94	186200.93	31
30	53729.96	84339.14	63707.03	156968.56	118568.91	186115.90	30

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32	Sinus		Tangens		Secans		
30	53729.96	84339.14	63707.03	156968.56	118568.91	186115.90	30
31	53754.49	84323.51	63747.93	156867.84	118590.89	186030.96	29
32	53779.02	84307.87	63788.85	156767.22	118612.89	185946.12	28
33	53803.54	84292.22	63829.78	156666.69	118634.91	185861.38	27
34	53828.06	84276.57	63870.73	156566.25	118656.95	185776.72	26
35	53852.57	84260.91	63911.69	156465.90	118679.00	185692.16	25
36	53877.08	84245.24	63952.67	156365.64	118701.07	185607.69	24
37	53901.58	84229.56	63993.66	156265.48	118723.16	185523.31	23
38	53926.08	84213.88	64034.67	156165.40	118745.27	185439.03	22
39	53950.58	84198.19	64075.69	156065.42	118767.40	185354.83	21
40	53975.07	84182.49	64116.73	155965.52	118789.55	185270.73	20
41	53999.55	84166.79	64157.79	155865.72	118811.71	185186.72	19
42	54024.03	84151.08	64198.86	155766.01	118833.89	185102.81	18
43	54048.51	84135.36	64239.95	155666.39	118856.09	185018.98	17
44	54072.98	84119.63	64281.05	155566.85	118878.31	184935.25	16
45	54097.45	84103.90	64322.16	155467.41	118900.55	184851.61	15
46	54121.91	84088.16	64363.29	155368.06	118922.81	184768.05	14
47	54146.37	84072.41	64404.44	155268.80	118945.08	184684.59	13
48	54170.82	84056.66	64445.60	155169.63	118967.37	184601.23	12
49	54195.27	84040.90	64486.78	155070.54	118989.68	184517.95	11
50	54219.71	84025.13	64527.97	154971.55	119012.01	184434.76	10
51	54244.15	84009.35	64569.18	154872.64	119034.36	184351.66	9
52	54268.59	83993.57	64610.41	154773.83	119056.73	184268.66	8
53	54293.02	83977.78	64651.65	154675.10	119079.12	184185.74	7
54	54317.44	83961.98	64692.90	154576.46	119101.52	184102.92	6
55	54341.86	83946.18	64734.17	154477.92	119123.94	184020.18	5
56	54366.28	83930.37	64775.46	154379.46	119146.38	183937.53	4
57	54390.69	83914.55	64816.76	154281.08	119168.84	183854.98	3
58	54415.10	83898.73	64858.08	154182.80	119191.32	183772.51	2
59	54439.50	83882.90	64899.41	154084.60	119213.82	183690.13	1
60	54463.90	83867.06	64940.76	153986.50	119236.33	183607.84	0

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33	Sinus		Tangens		Secans		
0	54463.90	83867.06	64940.76	153986.50	119236.33	183607.84	60
1	54488.30	83851.21	64982.12	153888.48	119258.86	183525.64	59
2	54512.69	83835.36	65023.50	153790.55	119281.41	183443.53	58
3	54537.07	83819.50	65064.90	153692.70	119303.98	183361.51	57
4	54561.45	83803.63	65106.31	153594.94	119326.57	183279.58	56
5	54585.83	83787.75	65147.74	153497.27	119349.18	183197.74	55
6	54610.20	83771.87	65189.18	153399.69	119371.81	183115.99	54
7	54634.56	83755.98	65230.64	153302.20	119394.46	183034.32	53
8	54658.92	83740.08	65272.11	153204.79	119417.12	182952.74	52
9	54683.28	83724.18	65313.60	153107.47	119439.80	182871.25	51
10	54707.63	83708.27	65355.11	153010.23	119462.50	182789.85	50
11	54731.98	83692.35	65396.63	152913.08	119485.22	182708.54	49
12	54756.32	83676.43	65438.17	152816.02	119507.96	182627.31	48
13	54780.66	83660.50	65479.72	152719.04	119530.72	182546.17	47
14	54804.99	83644.56	65521.29	152622.15	119553.50	182465.12	46
15	54829.32	83628.61	65562.87	152525.35	119576.30	182384.16	45
16	54853.65	83612.66	65604.47	152428.63	119599.11	182303.28	44
17	54877.97	83596.70	65646.09	152332.00	119621.94	182222.49	43
18	54902.28	83580.73	65687.72	152235.45	119644.79	182141.79	42
19	54926.59	83564.76	65729.37	152138.99	119667.66	182061.18	41
20	54950.90	83548.78	65771.03	152042.61	119690.55	181980.65	40
21	54975.20	83532.79	65812.71	151946.32	119713.46	181900.21	39
22	54999.50	83516.80	65854.41	151850.12	119736.39	181819.85	38
23	55023.79	83500.80	65896.12	151754.00	119759.34	181739.58	37
24	55048.08	83484.79	65937.85	151657.96	119782.31	181659.40	36
25	55072.36	83468.77	65979.59	151562.01	119805.29	181579.30	35
26	55096.64	83452.75	66021.35	151466.14	119828.29	181499.29	34
27	55120.91	83436.72	66063.13	151370.36	119851.31	181419.37	33
28	55145.18	83420.68	66104.92	151274.66	119874.35	181339.53	32
29	55169.44	83404.63	66146.73	151179.05	119897.41	181259.77	31
30	55193.70	83388.58	66188.56	151083.52	119920.49	181180.10	30

33	Sinus		Tangens		Secans		
30	55193.70	83388.58	66188.56	151083.52	119920.49	181180.10	30
31	55217.95	83372.52	66230.40	150988.07	119943.59	181100.52	29
32	55242.20	83356.45	66272.26	150892.71	119966.71	181021.02	28
33	55266.45	83340.38	66314.13	150797.43	119989.85	180941.61	27
34	55290.69	83324.30	66356.02	150702.24	120013.01	180862.28	26
35	55314.92	83308.21	66397.92	150607.13	120036.19	180783.04	25
36	55339.15	83292.12	66439.84	150512.10	120059.38	180703.88	24
37	55363.38	83276.02	66481.78	150417.16	120082.59	180624.81	23
38	55387.60	83259.91	66523.73	150322.30	120105.82	180545.82	22
39	55411.82	83243.80	66565.70	150227.52	120129.07	180466.91	21
40	55436.03	83227.68	66607.69	150132.82	120152.34	180388.09	20
41	55460.24	83211.55	66649.69	150038.20	120175.63	180309.35	19
42	55484.44	83195.41	66691.71	149943.67	120198.94	180230.70	18
43	55508.64	83179.27	66733.75	149849.22	120222.27	180152.13	17
44	55532.83	83163.12	66775.80	149754.86	120245.62	180073.65	16
45	55557.02	83146.96	66817.87	149660.58	120268.99	179995.25	15
46	55581.21	83130.79	66859.95	149566.38	120292.37	179916.93	14
47	55605.39	83114.62	66902.05	149472.26	120315.77	179838.69	13
48	55629.56	83098.44	66944.17	149378.22	120339.19	179760.54	12
49	55653.73	83082.26	66986.30	149284.26	120362.64	179682.47	11
50	55677.90	83066.07	67028.45	149190.38	120386.10	179604.48	10
51	55702.06	83049.87	67070.62	149096.59	120409.58	179526.58	9
52	55726.21	83033.66	67112.80	149002.88	120433.08	179448.76	8
53	55750.36	83017.45	67155.00	148909.25	120456.60	179371.02	7
54	55774.51	83001.23	67197.21	148815.70	120480.14	179293.37	6
55	55798.65	82985.00	67239.44	148722.23	120503.70	179215.80	5
56	55822.79	82968.76	67281.69	148628.84	120527.28	179138.31	4
57	55846.92	82952.52	67323.96	148535.53	120550.88	179060.90	3
58	55871.05	82936.27	67366.24	148442.30	120574.50	178983.58	2
59	55895.17	82920.02	67408.54	148349.16	120598.14	178906.33	1
60	55919.29	82903.76	67450.85	148256.10	120621.80	178829.16	0

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34	Sinus		Tangens		Secans		
0	55919.29	82903.76	67450.85	148256.10	120621.80	178829.16	60
1	55943.40	82887.49	67493.18	148163.11	120645.48	178752.08	59
2	55967.51	82871.21	67535.53	148070.21	120669.18	178675.08	58
3	55991.61	82854.93	67577.90	147977.38	120692.89	178598.17	57
4	56015.71	82838.64	67620.28	147884.63	120716.62	178521.33	56
5	56039.81	82822.34	67662.68	147791.97	120740.37	178444.57	55
6	56063.90	82806.03	67705.09	147699.38	120764.14	178367.90	54
7	56087.98	82789.72	67747.52	147606.88	120787.93	178291.31	53
8	56112.06	82773.40	67789.97	147514.45	120811.75	178214.79	52
9	56136.14	82757.07	67832.44	147422.10	120835.59	178138.36	51
10	56160.21	82740.74	67874.92	147329.83	120859.44	178062.01	50
11	56184.28	82724.40	67917.42	147237.64	120883.31	177985.74	49
12	56208.34	82708.05	67959.93	147145.53	120907.20	177909.55	48
13	56232.39	82691.70	68002.46	147053.50	120931.12	177833.43	47
14	56256.44	82675.34	68045.01	146961.55	120955.05	177757.40	46
15	56280.49	82658.97	68087.58	146869.67	120979.00	177681.45	45
16	56304.53	82642.60	68130.16	146777.87	121002.97	177605.58	44
17	56328.57	82626.22	68172.76	146686.16	121026.96	177529.79	43
18	56352.60	82609.83	68215.38	146594.52	121050.97	177454.08	42
19	56376.63	82593.43	68258.01	146502.96	121075.00	177378.45	41
20	56400.65	82577.03	68300.66	146411.47	121099.05	177302.90	40
21	56424.67	82560.62	68343.33	146320.07	121123.12	177227.43	39
22	56448.69	82544.20	68386.01	146228.74	121147.21	177152.04	38
23	56472.70	82527.78	68428.71	146137.49	121171.32	177076.73	37
24	56496.70	82511.35	68471.43	146046.32	121195.45	177001.49	36
25	56520.70	82494.91	68514.17	145955.22	121219.60	176926.33	35
26	56544.69	82478.47	68556.92	145864.20	121243.77	176851.25	34
27	56568.68	82462.02	68599.69	145773.26	121267.96	176776.25	33
28	56592.67	82445.56	68642.47	145682.40	121292.17	176701.33	32
29	56616.65	82429.09	68685.27	145591.61	121316.40	176626.49	31
30	56640.62	82412.62	68728.10	145500.90	121340.64	176551.73	30

34	Sinus		Tangens		Secans		
30	56640.62	82412.62	68728.10	145500.90	121340.64	176551.73	30
31	56664.59	82396.14	68770.94	145410.27	121364.91	176477.04	29
32	56688.56	82379.65	68813.79	145319.71	121389.20	176402.43	28
33	56712.52	82363.16	68856.66	145229.23	121413.51	176327.91	27
34	56736.48	82346.66	68899.55	145138.83	121437.83	176253.45	26
35	56760.43	82330.15	68942.46	145048.50	121462.18	176179.08	25
36	56784.37	82313.64	68985.38	144958.25	121486.55	176104.78	24
37	56808.31	82297.12	69028.32	144868.08	121510.94	176030.56	23
38	56832.25	82280.59	69071.28	144777.98	121535.35	175956.42	22
39	56856.18	82264.05	69114.25	144687.96	121559.78	175882.36	21
40	56880.11	82247.51	69157.24	144598.01	121584.23	175808.37	20
41	56904.03	82230.96	69200.25	144508.14	121608.70	175734.46	19
42	56927.95	82214.40	69243.28	144418.34	121633.19	175660.63	18
43	56951.86	82197.84	69286.33	144328.62	121657.70	175586.87	17
44	56975.77	82181.27	69329.39	144238.97	121682.23	175513.19	16
45	56999.68	82164.69	69372.47	144149.40	121706.78	175439.59	15
46	57023.58	82148.11	69415.57	144059.91	121731.35	175366.07	14
47	57047.47	82131.52	69458.68	143970.49	121755.94	175292.62	13
48	57071.36	82114.92	69501.81	143881.14	121780.55	175219.24	12
49	57095.24	82098.31	69544.96	143791.87	121805.18	175145.94	11
50	57119.12	82081.70	69588.13	143702.68	121829.83	175072.73	10
51	57142.99	82065.08	69631.31	143613.56	121854.50	174999.58	9
52	57166.86	82048.46	69674.51	143524.51	121879.19	174926.51	8
53	57190.73	82031.83	69717.73	143435.54	121903.90	174853.52	7
54	57214.59	82015.19	69760.97	143346.64	121928.64	174780.60	6
55	57238.44	81998.54	69804.22	143257.81	121953.39	174707.76	5
56	57262.29	81981.89	69847.49	143169.06	121978.16	174634.99	4
57	57286.14	81965.23	69890.78	143080.39	122002.96	174562.30	3
58	57309.98	81948.56	69934.09	142991.78	122027.77	174489.69	2
59	57333.81	81931.89	69977.41	142903.26	122052.60	174417.15	1
60	57357.64	81915.21	70020.75	142814.80	122077.46	174344.68	0

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35	Sinus		Tangens		Secans		
0	57357.64	81915.21	70020.75	142814.80	122077.46	174344.68	60
1	57381.47	81898.52	70064.11	142726.42	122102.33	174272.29	59
2	57405.29	81881.82	70107.49	142638.11	122127.23	174199.97	58
3	57429.11	81865.12	70150.89	142549.87	122152.15	174127.73	57
4	57452.92	81848.41	70194.30	142461.71	122177.08	174055.56	56
5	57476.72	81831.69	70237.73	142373.62	122202.04	173983.47	55
6	57500.52	81814.97	70281.18	142285.61	122227.02	173911.45	54
7	57524.32	81798.24	70324.65	142197.66	122252.02	173839.51	53
8	57548.11	81781.50	70368.13	142109.79	122277.03	173767.64	52
9	57571.90	81764.76	70411.63	142022.00	122302.07	173695.85	51
10	57595.68	81748.01	70455.15	141934.27	122327.13	173624.13	50
11	57619.46	81731.25	70498.69	141846.62	122352.21	173552.47	49
12	57643.23	81714.49	70542.24	141759.04	122377.32	173480.90	48
13	57667.00	81697.72	70585.81	141671.53	122402.44	173409.41	47
14	57690.76	81680.94	70629.40	141584.09	122427.58	173337.98	46
15	57714.52	81664.15	70673.01	141496.73	122452.74	173266.63	45
16	57738.27	81647.36	70716.64	141409.43	122477.93	173195.35	44
17	57762.02	81630.56	70760.29	141322.21	122503.13	173124.14	43
18	57785.76	81613.76	70803.95	141235.06	122528.36	173053.01	42
19	57809.50	81596.95	70847.63	141147.99	122553.61	172981.95	41
20	57833.23	81580.13	70891.33	141060.98	122578.87	172910.96	40
21	57856.96	81563.30	70935.05	140974.05	122604.16	172840.05	39
22	57880.68	81546.47	70978.78	140887.18	122629.47	172769.21	38
23	57904.40	81529.63	71022.53	140800.39	122654.80	172698.44	37
24	57928.12	81512.78	71066.30	140713.67	122680.15	172627.74	36
25	57951.83	81495.93	71110.09	140627.02	122705.52	172557.12	35
26	57975.53	81479.06	71153.90	140540.44	122730.91	172486.57	34
27	57999.23	81462.19	71197.73	140453.93	122756.33	172416.09	33
28	58022.92	81445.32	71241.57	140367.49	122781.76	172345.68	32
29	58046.61	81428.44	71285.43	140281.13	122807.21	172275.34	31
30	58070.30	81411.55	71329.31	140194.83	122832.69	172205.08	30

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35	Sinus		Tangens		Secans		
30	58070.30	81411.55	71329.31	140194.83	122832.69	172205.08	30
31	58093.98	81394.65	71373.21	140108.60	122858.19	172134.89	29
32	58117.65	81377.75	71417.13	140022.45	122883.71	172064.77	28
33	58141.32	81360.84	71461.06	139936.36	122909.25	171994.72	27
34	58164.98	81343.93	71505.01	139850.34	122934.81	171924.75	26
35	58188.64	81327.01	71548.98	139764.40	122960.39	171854.84	25
36	58212.30	81310.08	71592.97	139678.52	122985.99	171785.01	24
37	58235.95	81293.14	71636.98	139592.72	123011.61	171715.25	23
38	58259.59	81276.20	71681.01	139506.98	123037.25	171645.56	22
39	58283.23	81259.25	71725.05	139421.31	123062.92	171575.94	21
40	58306.87	81242.29	71769.11	139335.71	123088.61	171506.39	20
41	58330.50	81225.32	71813.19	139250.18	123114.32	171436.91	19
42	58354.12	81208.35	71857.29	139164.73	123140.05	171367.50	18
43	58377.74	81191.37	71901.41	139079.34	123165.80	171298.17	17
44	58401.36	81174.39	71945.55	138994.01	123191.57	171228.90	16
45	58424.97	81157.40	71989.70	138908.76	123217.36	171159.70	15
46	58448.57	81140.40	72033.87	138823.58	123243.17	171090.58	14
47	58472.17	81123.39	72078.06	138738.46	123269.00	171021.52	13
48	58495.77	81106.38	72122.27	138653.42	123294.86	170952.54	12
49	58519.36	81089.36	72166.50	138568.44	123320.74	170883.62	11
50	58542.94	81072.33	72210.75	138483.53	123346.64	170814.78	10
51	58566.52	81055.30	72255.02	138398.69	123372.56	170746.00	9
52	58590.10	81038.26	72299.31	138313.92	123398.50	170677.30	8
53	58613.67	81021.21	72343.61	138229.22	123424.46	170608.66	7
54	58637.24	81004.16	72387.93	138144.58	123450.44	170540.10	6
55	58660.80	80987.10	72432.27	138060.01	123476.45	170471.60	5
56	58684.35	80970.03	72476.63	137975.51	123502.48	170403.18	4
57	58707.90	80952.96	72521.01	137891.08	123528.52	170334.82	3
58	58731.45	80935.88	72565.41	137806.72	123554.59	170266.53	2
59	58754.99	80918.79	72609.83	137722.42	123580.68	170198.31	1
60	58778.53	80901.70	72654.26	137638.19	123606.80	170130.16	0

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36	Sinus		Tangens		Secans		
0	58778.53	80901.70	72654.26	137638.19	123606.80	170130.16	60
1	58802.06	80884.60	72698.71	137554.03	123632.94	170062.08	59
2	58825.58	80867.49	72743.18	137469.94	123659.09	169994.07	58
3	58849.10	80850.37	72787.67	137385.91	123685.26	169926.12	57
4	58872.62	80833.25	72832.18	137301.95	123711.48	169858.25	56
5	58896.13	80816.12	72876.71	137218.05	123737.68	169790.44	55
6	58919.64	80798.99	72921.26	137134.23	123763.93	169722.71	54
7	58943.14	80781.85	72965.82	137050.47	123790.19	169655.04	53
8	58966.63	80764.70	73010.40	136966.78	123816.47	169587.43	52
9	58990.12	80747.54	73055.01	136883.15	123842.78	169519.90	51
10	59013.61	80730.38	73099.63	136799.59	123869.11	169452.44	50
11	59037.09	80713.21	73144.27	136716.10	123895.46	169385.04	49
12	59060.57	80696.03	73188.94	136632.67	123921.83	169317.71	48
13	59084.04	80678.85	73233.62	136549.31	123948.22	169250.45	47
14	59107.50	80661.66	73278.31	136466.02	123974.64	169183.26	46
15	59130.96	80644.46	73323.03	136382.79	124001.08	169116.13	45
16	59154.42	80627.26	73367.77	136299.63	124027.54	169049.07	44
17	59177.87	80610.05	73412.53	136216.53	124054.02	168982.08	43
18	59201.32	80592.83	73457.30	136133.50	124080.52	168915.16	42
19	59224.76	80575.60	73502.10	136050.54	124107.04	168848.30	41
20	59248.19	80558.37	73546.91	135967.64	124133.59	168781.51	40
21	59271.62	80541.13	73591.74	135884.81	124160.16	168714.79	39
22	59295.05	80523.89	73636.60	135802.04	124186.75	168648.14	38
23	59318.47	80506.64	73681.47	135719.34	124213.36	168581.55	37
24	59341.89	80489.38	73726.36	135636.70	124239.99	168515.03	36
25	59365.30	80472.11	73771.27	135554.13	124266.65	168448.57	35
26	59388.71	80454.84	73816.20	135471.62	124293.33	168382.18	34
27	59412.11	80437.56	73861.15	135389.18	124320.03	168315.86	33
28	59435.50	80420.28	73906.11	135306.80	124346.75	168249.61	32
29	59458.89	80402.99	73951.10	135224.49	124373.49	168183.42	31
30	59482.28	80385.69	73996.11	135142.24	124400.26	168117.30	30

36	Sinus		Tangens		Secans		
30	59482.28	80385.69	73996.11	135142.24	124400.26	168117.30	30
31	59505.66	80368.38	74041.14	135060.06	124427.05	168051.24	29
32	59529.03	80351.07	74086.18	134977.94	124453.86	167985.25	28
33	59552.40	80333.75	74131.24	134895.89	124480.69	167919.33	27
34	59575.77	80316.42	74176.33	134813.90	124507.54	167853.47	26
35	59599.13	80299.09	74221.43	134731.97	124534.42	167787.68	25
36	59622.49	80281.75	74266.55	134650.11	124561.31	167721.95	24
37	59645.84	80264.40	74311.70	134568.32	124588.23	167656.29	23
38	59669.18	80247.05	74356.86	134486.58	124615.18	167590.70	22
39	59692.52	80229.69	74402.04	134404.92	124642.14	167525.17	21
40	59715.86	80212.32	74447.24	134323.31	124669.13	167459.70	20
41	59739.19	80194.94	74492.46	134241.77	124696.14	167394.30	19
42	59762.51	80177.56	74537.70	134160.29	124723.17	167328.97	18
43	59785.83	80160.17	74582.96	134078.88	124750.22	167263.70	17
44	59809.15	80142.78	74628.24	133997.53	124777.30	167198.50	16
45	59832.46	80125.38	74673.54	133916.24	124804.40	167133.36	15
46	59855.76	80107.97	74718.86	133835.02	124831.52	167068.28	14
47	59879.06	80090.56	74764.20	133753.86	124858.66	167003.28	13
48	59902.36	80073.14	74809.56	133672.76	124885.83	166938.33	12
49	59925.65	80055.71	74854.94	133591.72	124913.02	166873.45	11
50	59948.93	80038.27	74900.33	133510.75	124940.23	166808.64	10
51	59972.21	80020.83	74945.75	133429.84	124967.46	166743.89	9
52	59995.49	80003.38	74991.19	133349.00	124994.71	166679.20	8
53	60018.76	79985.93	75036.65	133268.22	125021.99	166614.58	7
54	60042.02	79968.47	75082.12	133187.49	125049.29	166550.02	6
55	60065.28	79951.00	75127.62	133106.84	125076.61	166485.52	5
56	60088.53	79933.52	75173.14	133026.24	125103.96	166421.09	4
57	60111.78	79916.04	75218.67	132945.71	125131.33	166356.73	3
58	60135.03	79898.55	75264.23	132865.24	125158.72	166292.43	2
59	60158.27	79881.05	75309.81	132784.83	125186.13	166228.19	1
60	60181.50	79863.55	75355.40	132704.48	125213.57	166164.01	0

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37	Sinus		Tangens		Secans		
0	60181.50	79863.55	75355.40	132704.48	125213.57	166164.01	60
1	60204.73	79846.04	75401.02	132624.20	125241.02	166099.90	59
2	60227.95	79828.52	75446.66	132543.97	125268.50	166035.85	58
3	60251.17	79811.00	75492.32	132463.81	125296.01	165971.87	57
4	60274.39	79793.47	75537.99	132383.71	125323.53	165907.95	56
5	60297.60	79775.93	75583.69	132303.68	125351.08	165844.09	55
6	60320.80	79758.39	75629.41	132223.70	125378.65	165780.30	54
7	60344.00	79740.84	75675.14	132143.79	125406.25	165716.57	53
8	60367.19	79723.28	75720.90	132063.93	125433.87	165652.90	52
9	60390.38	79705.72	75766.68	131984.14	125461.51	165589.29	51
10	60413.56	79688.15	75812.48	131904.41	125489.17	165525.75	50
11	60436.74	79670.57	75858.29	131824.74	125516.85	165462.27	49
12	60459.91	79652.99	75904.13	131745.13	125544.56	165398.85	48
13	60483.08	79635.40	75949.99	131665.59	125572.29	165335.50	47
14	60506.24	79617.80	75995.87	131586.10	125600.05	165272.21	46
15	60529.40	79600.20	76041.77	131506.68	125627.82	165208.98	45
16	60552.55	79582.59	76087.69	131427.31	125655.62	165145.81	44
17	60575.70	79564.97	76133.63	131348.01	125683.45	165082.70	43
18	60598.84	79547.35	76179.59	131268.76	125711.29	165019.66	42
19	60621.98	79529.72	76225.57	131189.58	125739.16	164956.68	41
20	60645.11	79512.08	76271.57	131110.46	125767.05	164893.76	40
21	60668.23	79494.43	76317.59	131031.40	125794.97	164830.90	39
22	60691.35	79476.78	76363.63	130952.39	125822.91	164768.11	38
23	60714.47	79459.12	76409.69	130873.45	125850.87	164705.37	37
24	60737.58	79441.46	76455.77	130794.57	125878.85	164642.70	36
25	60760.69	79423.79	76501.88	130715.75	125906.86	164580.09	35
26	60783.79	79406.11	76548.00	130636.99	125934.89	164517.54	34
27	60806.89	79388.43	76594.14	130558.28	125962.94	164455.06	33
28	60829.98	79370.74	76640.31	130479.64	125991.02	164392.63	32
29	60853.06	79353.04	76686.49	130401.06	126019.12	164330.27	31
30	60876.14	79335.33	76732.70	130322.54	126047.24	164267.96	30
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37	Sinus		Tangens		Secans		
30	60876.14	79335.33	76732.70	130322.54	126047.24	164267.96	30
31	60899.22	79317.62	76778.93	130244.07	126075.39	164205.72	29
32	60922.29	79299.90	76825.17	130165.67	126103.56	164143.54	28
33	60945.35	79282.18	76871.44	130087.32	126131.75	164081.42	27
34	60968.41	79264.45	76917.73	130009.04	126159.97	164019.36	26
35	60991.47	79246.71	76964.04	129930.81	126188.20	163957.36	25
36	61014.52	79228.96	77010.37	129852.65	126216.46	163895.42	24
37	61037.56	79211.21	77056.72	129774.54	126244.75	163833.55	23
38	61060.60	79193.45	77103.09	129696.49	126273.06	163771.73	22
39	61083.63	79175.69	77149.48	129618.50	126301.40	163709.97	21
40	61106.66	79157.92	77195.89	129540.57	126329.75	163648.28	20
41	61129.68	79140.14	77242.33	129462.69	126358.13	163586.64	19
42	61152.70	79122.35	77288.79	129384.88	126386.53	163525.07	18
43	61175.72	79104.56	77335.26	129307.12	126414.96	163463.55	17
44	61198.73	79086.76	77381.75	129229.43	126443.41	163402.10	16
45	61221.73	79068.96	77428.27	129151.79	126471.88	163340.70	15
46	61244.73	79051.15	77474.81	129074.21	126500.38	163279.37	14
47	61267.72	79033.33	77521.37	128996.69	126528.90	163218.09	13
48	61290.71	79015.50	77567.95	128919.22	126557.45	163156.88	12
49	61313.69	78997.67	77614.55	128841.82	126586.01	163095.72	11
50	61336.66	78979.83	77661.17	128764.47	126614.60	163034.62	10
51	61359.63	78961.98	77707.82	128687.18	126643.22	162973.59	9
52	61382.60	78944.13	77754.48	128609.95	126671.86	162912.61	8
53	61405.56	78926.27	77801.17	128532.77	126700.52	162851.69	7
54	61428.52	78908.41	77847.88	128455.66	126729.21	162790.83	6
55	61451.47	78890.54	77894.60	128378.60	126757.92	162730.03	5
56	61474.42	78872.66	77941.35	128301.60	126786.65	162669.29	4
57	61497.36	78854.77	77988.12	128224.66	126815.41	162608.61	3
58	61520.29	78836.88	78034.92	128147.76	126844.19	162547.99	2
59	61543.22	78818.98	78081.73	128070.93	126872.99	162487.43	1
60	61566.15	78801.07	78128.56	127994.16	126901.82	162426.92	0

38	Sinus		Tangens		Secans		
0	61566.15	78801.07	78128.56	127994.16	126901.82	162426.92	60
1	61589.07	78783.16	78175.42	127917.45	126930.67	162366.48	59
2	61611.98	78765.24	78222.29	127840.79	126959.55	162306.09	58
3	61634.89	78747.32	78269.19	127764.19	126988.45	162245.76	57
4	61657.79	78729.39	78316.11	127687.64	127017.37	162185.49	56
5	61680.69	78711.45	78363.05	127611.16	127046.32	162125.28	55
6	61703.59	78693.50	78410.02	127534.73	127075.29	162065.13	54
7	61726.48	78675.55	78457.00	127458.36	127104.29	162005.04	53
8	61749.36	78657.59	78504.00	127382.04	127133.31	161945.00	52
9	61772.24	78639.62	78551.03	127305.78	127162.35	161885.02	51
10	61795.11	78621.65	78598.08	127229.57	127191.42	161825.10	50
11	61817.98	78603.67	78645.15	127153.42	127220.51	161765.24	49
12	61840.84	78585.69	78692.24	127077.33	127249.63	161705.44	48
13	61863.70	78567.70	78739.35	127001.30	127278.77	161645.69	47
14	61886.55	78549.70	78786.49	126925.32	127307.94	161586.00	46
15	61909.40	78531.69	78833.64	126849.39	127337.12	161526.37	45
16	61932.24	78513.68	78880.82	126773.53	127366.34	161466.80	44
17	61955.07	78495.66	78928.02	126697.72	127395.57	161407.28	43
18	61977.90	78477.64	78975.24	126621.96	127424.84	161347.83	42
19	62000.73	78459.61	79022.48	126546.26	127454.12	161288.43	41
20	62023.55	78441.57	79069.75	126470.62	127483.43	161229.08	40
21	62046.36	78423.52	79117.03	126395.03	127512.76	161169.80	39
22	62069.17	78405.47	79164.34	126319.50	127542.12	161110.57	38
23	62091.98	78387.41	79211.67	126244.02	127571.50	161051.40	37
24	62114.78	78369.35	79259.02	126168.60	127600.91	160992.28	36
25	62137.57	78351.28	79306.40	126093.23	127630.34	160933.23	35
26	62160.36	78333.20	79353.79	126017.92	127659.80	160874.23	34
27	62183.14	78315.11	79401.21	125942.67	127689.28	160815.28	33
28	62205.92	78297.02	79448.65	125867.47	127718.78	160756.40	32
29	62228.69	78278.92	79496.11	125792.32	127748.31	160697.57	31
30	62251.46	78260.82	79543.59	125717.23	127777.87	160638.79	30
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38	Sinus		Tangens		Secans		
30	62251.46	78260.82	79543.59	125717.23	127777.87	160638.79	30
31	62274.22	78242.71	79591.10	125642.19	127807.45	160580.08	29
32	62296.98	78224.59	79638.62	125567.21	127837.05	160521.42	28
33	62319.73	78206.46	79686.17	125492.29	127866.67	160462.81	27
34	62342.48	78188.33	79733.74	125417.42	127896.32	160404.26	26
35	62365.22	78170.19	79781.34	125342.60	127926.00	160345.77	25
36	62387.96	78152.05	79828.95	125267.84	127955.70	160287.34	24
37	62410.69	78133.90	79876.59	125193.13	127985.43	160228.96	23
38	62433.42	78115.74	79924.25	125118.48	128015.18	160170.64	22
39	62456.14	78097.57	79971.93	125043.88	128044.95	160112.37	21
40	62478.85	78079.40	80019.63	124969.33	128074.75	160054.16	20
41	62501.56	78061.22	80067.36	124894.84	128104.57	159996.00	19
42	62524.26	78043.04	80115.11	124820.40	128134.42	159937.90	18
43	62546.96	78024.85	80162.88	124746.02	128164.30	159879.86	17
44	62569.66	78006.65	80210.67	124671.69	128194.20	159821.87	16
45	62592.35	77988.45	80258.48	124597.42	128224.12	159763.94	15
46	62615.03	77970.24	80306.32	124523.20	128254.07	159706.06	14
47	62637.71	77952.02	80354.18	124449.03	128284.04	159648.24	13
48	62660.38	77933.80	80402.06	124374.92	128314.04	159590.47	12
49	62683.05	77915.57	80449.97	124300.86	128344.06	159532.76	11
50	62705.71	77897.33	80497.90	124226.85	128374.11	159475.11	10
51	62728.37	77879.08	80545.85	124152.90	128404.18	159417.51	9
52	62751.02	77860.83	80593.82	124079.00	128434.28	159359.96	8
53	62773.66	77842.57	80641.81	124005.15	128464.40	159302.47	7
54	62796.30	77824.31	80689.83	123931.36	128494.55	159245.04	6
55	62818.94	77806.04	80737.87	123857.62	128524.72	159187.66	5
56	62841.57	77787.77	80785.93	123783.93	128554.92	159130.33	4
57	62864.20	77769.49	80834.01	123710.30	128585.14	159073.06	3
58	62886.82	77751.20	80882.12	123636.72	128615.39	159015.84	2
59	62909.43	77732.90	80930.25	123563.19	128645.66	158958.68	1
60	62932.04	77714.60	80978.40	123489.72	128675.96	158901.57	0

39	Sinus		Tangens		Secans		
0	62932.04	77714.60	80978.40	123489.72	128675.96	158901.57	60
1	62954.64	77696.29	81026.58	123416.29	128706.28	158844.52	59
2	62977.24	77677.97	81074.78	123342.92	128736.63	158787.52	58
3	62999.83	77659.65	81123.00	123269.61	128767.00	158730.58	57
4	63022.42	77641.32	81171.24	123196.34	128797.40	158673.69	56
5	63045.00	77622.98	81219.51	123123.13	128827.82	158616.85	55
6	63067.58	77604.64	81267.80	123049.97	128858.27	158560.07	54
7	63090.15	77586.29	81316.11	122976.87	128888.75	158503.34	53
8	63112.72	77567.94	81364.44	122903.81	128919.25	158446.67	52
9	63135.28	77549.58	81412.80	122830.81	128949.77	158390.05	51
10	63157.84	77531.21	81461.18	122757.86	128980.32	158333.48	50
11	63180.39	77512.83	81509.58	122684.96	129010.90	158276.97	49
12	63202.93	77494.45	81558.01	122612.11	129041.50	158220.51	48
13	63225.47	77476.06	81606.46	122539.32	129072.13	158164.11	47
14	63248.00	77457.67	81654.93	122466.58	129102.78	158107.76	46
15	63270.53	77439.27	81703.43	122393.89	129133.46	158051.46	45
16	63293.05	77420.86	81751.95	122321.25	129164.16	157995.21	44
17	63315.57	77402.44	81800.49	122248.66	129194.89	157939.02	43
18	63338.08	77384.02	81849.05	122176.13	129225.64	157882.89	42
19	63360.59	77365.59	81897.64	122103.64	129256.42	157826.80	41
20	63383.09	77347.16	81946.25	122031.21	129287.23	157770.77	40
21	63405.59	77328.72	81994.88	121958.83	129318.06	157714.79	39
22	63428.08	77310.27	82043.54	121886.50	129348.92	157658.87	38
23	63450.57	77291.82	82092.22	121814.22	129379.80	157603.00	37
24	63473.05	77273.36	82140.93	121741.99	129410.71	157547.18	36
25	63495.53	77254.89	82189.65	121669.82	129441.64	157491.41	35
26	63518.00	77236.42	82238.40	121597.69	129472.60	157435.70	34
27	63540.46	77217.94	82287.18	121525.62	129503.59	157380.04	33
28	63562.92	77199.45	82335.97	121453.59	129534.60	157324.43	32
29	63585.37	77180.96	82384.79	121381.62	129565.64	157268.87	31
30	63607.82	77162.46	82433.64	121309.70	129596.70	157213.37	30
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39	Sinus		Tangens		Secans		
30	63607.82	77162.46	82433.64	121309.70	129596.70	157213.37	30
31	63630.26	77143.95	82482.51	121237.83	129627.79	157157.92	29
32	63652.70	77125.44	82531.40	121166.01	129658.90	157102.52	28
33	63675.13	77106.92	82580.31	121094.24	129690.04	157047.17	27
34	63697.56	77088.39	82629.25	121022.52	129721.21	156991.88	26
35	63719.98	77069.86	82678.21	120950.85	129752.40	156936.64	25
36	63742.40	77051.32	82727.19	120879.23	129783.62	156881.45	24
37	63764.81	77032.78	82776.20	120807.67	129814.87	156826.31	23
38	63787.21	77014.23	82825.23	120736.15	129846.14	156771.23	22
39	63809.61	76995.67	82874.29	120664.68	129877.44	156716.19	21
40	63832.01	76977.10	82923.37	120593.27	129908.76	156661.21	20
41	63854.40	76958.53	82972.47	120521.90	129940.11	156606.28	19
42	63876.78	76939.95	83021.60	120450.58	129971.48	156551.41	18
43	63899.16	76921.37	83070.75	120379.31	130002.88	156496.58	17
44	63921.53	76902.78	83119.92	120308.10	130034.31	156441.81	16
45	63943.90	76884.18	83169.12	120236.93	130065.76	156387.08	15
46	63966.26	76865.58	83218.34	120165.81	130097.24	156332.41	14
47	63988.62	76846.97	83267.59	120094.75	130128.75	156277.79	13
48	64010.97	76828.35	83316.86	120023.73	130160.28	156223.22	12
49	64033.32	76809.73	83366.15	119952.76	130191.84	156168.70	11
50	64055.66	76791.10	83415.47	119881.84	130223.43	156114.24	10
51	64077.99	76772.46	83464.81	119810.97	130255.04	156059.82	9
52	64100.32	76753.82	83514.18	119740.15	130286.68	156005.46	8
53	64122.64	76735.17	83563.57	119669.38	130318.34	155951.15	7
54	64144.96	76716.51	83612.98	119598.66	130350.03	155896.89	6
55	64167.27	76697.85	83662.42	119527.99	130381.75	155842.67	5
56	64189.58	76679.18	83711.88	119457.36	130413.49	155788.51	4
57	64211.88	76660.51	83761.36	119386.79	130445.26	155734.41	3
58	64234.18	76641.83	83810.87	119316.26	130477.06	155680.35	2
59	64256.47	76623.14	83860.40	119245.79	130508.88	155626.34	1
60	64278.76	76604.44	83909.96	119175.36	130540.73	155572.38	0

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40	Sinus		Tangens		Secans		
0	64278.76	76604.44	83909.96	119175.36	130540.73	155572.38	60
1	64301.04	76585.74	83959.54	119104.98	130572.61	155518.48	59
2	64323.32	76567.03	84009.15	119034.65	130604.51	155464.62	58
3	64345.59	76548.32	84058.78	118964.37	130636.44	155410.81	57
4	64367.85	76529.60	84108.44	118894.14	130668.39	155357.06	56
5	64390.11	76510.87	84158.12	118823.95	130700.37	155303.35	55
6	64412.36	76492.14	84207.82	118753.82	130732.38	155249.70	54
7	64434.61	76473.40	84257.55	118683.73	130764.42	155196.09	53
8	64456.85	76454.65	84307.30	118613.69	130796.49	155142.54	52
9	64479.09	76435.90	84357.08	118543.70	130828.58	155089.04	51
10	64501.32	76417.14	84406.88	118473.76	130860.70	155035.58	50
11	64523.55	76398.37	84456.70	118403.87	130892.84	154982.18	49
12	64545.77	76379.60	84506.55	118334.02	130925.01	154928.82	48
13	64567.98	76360.82	84556.43	118264.22	130957.21	154875.52	47
14	64590.19	76342.04	84606.33	118194.47	130989.43	154822.26	46
15	64612.40	76323.25	84656.25	118124.77	131021.68	154769.06	45
16	64634.60	76304.45	84706.20	118055.12	131053.96	154715.90	44
17	64656.79	76285.64	84756.17	117985.51	131086.26	154662.80	43
18	64678.98	76266.83	84806.17	117915.95	131118.59	154609.74	42
19	64701.16	76248.01	84856.19	117846.44	131150.95	154556.73	41
20	64723.34	76229.19	84906.24	117776.98	131183.34	154503.78	40
21	64745.51	76210.36	84956.31	117707.56	131215.75	154450.87	39
22	64767.67	76191.52	85006.40	117638.20	131248.19	154398.01	38
23	64789.83	76172.68	85056.52	117568.88	131280.66	154345.20	37
24	64811.99	76153.83	85106.67	117499.60	131313.16	154292.44	36
25	64834.14	76134.97	85156.84	117430.38	131345.68	154239.73	35
26	64856.28	76116.11	85207.04	117361.20	131378.23	154187.06	34
27	64878.42	76097.24	85257.26	117292.07	131410.81	154134.45	33
28	64900.55	76078.37	85307.50	117222.98	131443.41	154081.89	32
29	64922.68	76059.49	85357.77	117153.95	131476.04	154029.37	31
30	64944.80	76040.60	85408.07	117084.96	131508.70	153976.90	30

40	Sinus		Tangens		Secans		
30	64944.80	76040.60	85408.07	117084.96	131508.70	153976.90	30
31	64966.92	76021.70	85458.39	117016.01	131541.39	153924.49	29
32	64989.03	76002.80	85508.73	116947.12	131574.10	153872.12	28
33	65011.14	75983.89	85559.10	116878.27	131606.84	153819.80	27
34	65033.24	75964.98	85609.50	116809.47	131639.61	153767.52	26
35	65055.33	75946.06	85659.92	116740.71	131672.41	153715.30	25
36	65077.42	75927.13	85710.37	116672.00	131705.23	153663.12	24
37	65099.50	75908.20	85760.84	116603.34	131738.08	153611.00	23
38	65121.58	75889.26	85811.33	116534.72	131770.96	153558.92	22
39	65143.66	75870.31	85861.85	116466.15	131803.86	153506.89	21
40	65165.72	75851.36	85912.40	116397.63	131836.79	153454.91	20
41	65187.78	75832.40	85962.97	116329.16	131869.75	153402.97	19
42	65209.84	75813.43	86013.57	116260.73	131902.74	153351.09	18
43	65231.89	75794.46	86064.19	116192.34	131935.76	153299.25	17
44	65253.94	75775.48	86114.84	116124.00	131968.81	153247.46	16
45	65275.98	75756.50	86165.51	116055.71	132001.88	153195.72	15
46	65298.01	75737.51	86216.21	115987.47	132034.98	153144.03	14
47	65320.04	75718.51	86266.93	115919.27	132068.11	153092.38	13
48	65342.06	75699.50	86317.68	115851.11	132101.26	153040.78	12
49	65364.08	75680.49	86368.46	115783.01	132134.44	152989.23	11
50	65386.09	75661.47	86419.26	115714.95	132167.65	152937.73	10
51	65408.10	75642.45	86470.09	115646.93	132200.89	152886.27	9
52	65430.10	75623.42	86520.94	115578.96	132234.16	152834.87	8
53	65452.09	75604.39	86571.81	115511.04	132267.45	152783.51	7
54	65474.08	75585.35	86622.71	115443.16	132300.77	152732.19	6
55	65496.06	75566.30	86673.64	115375.32	132334.12	152680.93	5
56	65518.04	75547.24	86724.60	115307.54	132367.50	152629.71	4
57	65540.01	75528.18	86775.58	115239.79	132400.91	152578.54	3
58	65561.98	75509.11	86826.59	115172.10	132434.35	152527.41	2
59	65583.94	75490.04	86877.62	115104.45	132467.81	152476.34	1
60	65605.90	75470.96	86928.68	115036.84	132501.30	152425.31	0

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41	Sinus		Tangens		Secans		
0	65605.90	75470.96	86928.68	115036.84	132501.30	152425.31	60
1	65627.85	75451.87	86979.76	114969.28	132534.82	152374.33	59
2	65649.80	75432.78	87030.87	114901.76	132568.37	152323.39	58
3	65671.74	75413.68	87082.00	114834.29	132601.94	152272.50	57
4	65693.67	75394.57	87133.16	114766.87	132635.54	152221.66	56
5	65715.60	75375.46	87184.35	114699.49	132669.18	152170.87	55
6	65737.52	75356.34	87235.56	114632.15	132702.84	152120.12	54
7	65759.44	75337.21	87286.80	114564.86	132736.53	152069.42	53
8	65781.35	75318.08	87338.06	114497.62	132770.25	152018.76	52
9	65803.26	75298.94	87389.35	114430.42	132803.99	151968.15	51
10	65825.16	75279.80	87440.67	114363.26	132837.76	151917.59	50
11	65847.06	75260.65	87492.01	114296.15	132871.56	151867.08	49
12	65868.95	75241.49	87543.38	114229.08	132905.39	151816.61	48
13	65890.83	75222.33	87594.78	114162.06	132939.25	151766.19	47
14	65912.71	75203.16	87646.20	114095.08	132973.14	151715.81	46
15	65934.58	75183.98	87697.65	114028.15	133007.06	151665.48	45
16	65956.45	75164.80	87749.12	113961.26	133041.00	151615.20	44
17	65978.31	75145.61	87800.62	113894.41	133074.97	151564.96	43
18	66000.17	75126.41	87852.15	113827.61	133108.97	151514.77	42
19	66022.02	75107.21	87903.70	113760.85	133143.00	151464.62	41
20	66043.86	75088.00	87955.28	113694.14	133177.06	151414.52	40
21	66065.70	75068.79	88006.89	113627.47	133211.15	151364.47	39
22	66087.53	75049.57	88058.52	113560.85	133245.27	151314.46	38
23	66109.36	75030.34	88110.18	113494.27	133279.42	151264.50	37
24	66131.18	75011.11	88161.86	113427.73	133313.59	151214.59	36
25	66153.00	74991.87	88213.57	113361.24	133347.79	151164.72	35
26	66174.81	74972.62	88265.31	113294.79	133382.02	151114.89	34
27	66196.62	74953.37	88317.07	113228.39	133416.28	151065.11	33
28	66218.42	74934.11	88368.86	113162.03	133450.57	151015.38	32
29	66240.22	74914.84	88420.68	113095.71	133484.89	150965.69	31
30	66262.01	74895.57	88472.53	113029.44	133519.24	150916.05	30

41	Sinus		Tangens		Secans		
30	66262.01	74895.57	88472.53	113029.44	133519.24	150916.05	30
31	66283.79	74876.29	88524.40	112963.21	133553.62	150866.45	29
32	66305.57	74857.01	88576.30	112897.02	133588.03	150816.90	28
33	66327.34	74837.72	88628.22	112830.88	133622.46	150767.39	27
34	66349.11	74818.42	88680.17	112764.78	133656.92	150717.93	26
35	66370.87	74799.12	88732.15	112698.72	133691.41	150668.52	25
36	66392.62	74779.81	88784.16	112632.71	133725.94	150619.15	24
37	66414.37	74760.49	88836.20	112566.74	133760.49	150569.82	23
38	66436.11	74741.17	88888.26	112500.81	133795.07	150520.54	22
39	66457.85	74721.84	88940.34	112434.93	133829.68	150471.31	21
40	66479.59	74702.51	88992.45	112369.09	133864.32	150422.11	20
41	66501.32	74683.17	89044.59	112303.29	133898.99	150372.97	19
42	66523.04	74663.82	89096.75	112237.54	133933.69	150323.87	18
43	66544.75	74644.46	89148.94	112171.83	133968.42	150274.81	17
44	66566.46	74625.10	89201.16	112106.16	134003.17	150225.80	16
45	66588.17	74605.74	89253.41	112040.53	134037.95	150176.83	15
46	66609.87	74586.37	89305.69	111974.95	134072.76	150127.91	14
47	66631.56	74566.99	89357.99	111909.41	134107.61	150079.03	13
48	66653.25	74547.60	89410.32	111843.91	134142.48	150030.20	12
49	66674.93	74528.21	89462.68	111778.46	134177.38	149981.41	11
50	66696.61	74508.81	89515.06	111713.05	134212.32	149932.67	10
51	66718.28	74489.40	89567.47	111647.68	134247.28	149883.97	9
52	66739.94	74469.99	89619.91	111582.35	134282.27	149835.31	8
53	66761.60	74450.57	89672.38	111517.06	134317.29	149786.70	7
54	66783.26	74431.15	89724.87	111451.82	134352.34	149738.13	6
55	66804.91	74411.72	89777.39	111386.62	134387.42	149689.61	5
56	66826.55	74392.29	89829.94	111321.46	134422.53	149641.13	4
57	66848.18	74372.85	89882.52	111256.35	134457.67	149592.70	3
58	66869.81	74353.40	89935.12	111191.27	134492.84	149544.30	2
59	66891.44	74333.94	89987.75	111126.24	134528.04	149495.96	1
60	66913.06	74314.48	90040.41	111061.25	134563.27	149447.65	0

42	Sinus		Tangens		Secans		
0	66913.06	74314.48	90040.41	111061.25	134563.27	149447.65	60
1	66934.67	74295.01	90093.09	110996.30	134598.53	149399.40	59
2	66956.28	74275.54	90145.80	110931.40	134633.82	149351.18	58
3	66977.88	74256.06	90198.54	110866.53	134669.14	149303.01	57
4	66999.48	74236.57	90251.31	110801.71	134704.49	149254.88	56
5	67021.07	74217.08	90304.11	110736.93	134739.87	149206.80	55
6	67042.66	74197.58	90356.94	110672.19	134775.28	149158.75	54
7	67064.24	74178.08	90409.79	110607.50	134810.72	149110.76	53
8	67085.82	74158.57	90462.67	110542.84	134846.19	149062.80	52
9	67107.39	74139.05	90515.58	110478.23	134881.69	149014.89	51
10	67128.95	74119.53	90568.51	110413.65	134917.21	148967.03	50
11	67150.51	74100.00	90621.47	110349.12	134952.77	148919.20	49
12	67172.06	74080.46	90674.46	110284.63	134988.36	148871.42	48
13	67193.61	74060.92	90727.48	110220.19	135023.98	148823.69	47
14	67215.15	74041.37	90780.53	110155.78	135059.63	148775.99	46
15	67236.68	74021.81	90833.60	110091.41	135095.31	148728.34	45
16	67258.21	74002.25	90886.71	110027.09	135131.02	148680.73	44
17	67279.73	73982.68	90939.84	109962.81	135166.76	148633.17	43
18	67301.25	73963.11	90993.00	109898.56	135202.54	148585.65	42
19	67322.76	73943.53	91046.19	109834.36	135238.34	148538.17	41
20	67344.27	73923.94	91099.41	109770.20	135274.17	148490.73	40
21	67365.77	73904.35	91152.65	109706.08	135310.03	148443.34	39
22	67387.27	73884.75	91205.92	109642.01	135345.93	148395.99	38
23	67408.76	73865.15	91259.22	109577.97	135381.86	148348.68	37
24	67430.24	73845.54	91312.55	109513.97	135417.81	148301.42	36
25	67451.72	73825.92	91365.91	109450.02	135453.79	148254.20	35
26	67473.19	73806.29	91419.29	109386.10	135489.80	148207.02	34
27	67494.66	73786.66	91472.70	109322.23	135525.85	148159.88	33
28	67516.12	73767.02	91526.15	109258.40	135561.93	148112.78	32
29	67537.57	73747.38	91579.62	109194.60	135598.03	148065.73	31
30	67559.02	73727.73	91633.12	109130.85	135634.17	148018.72	30

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42	Sinus		Tangens		Secans		
30	67559.02	73727.73	91633.12	109130.85	135634.17	148018.72	30
31	67580.46	73708.08	91686.65	109067.14	135670.34	147971.76	29
32	67601.90	73688.42	91740.20	109003.47	135706.54	147924.83	28
33	67623.33	73668.75	91793.79	108939.83	135742.77	147877.95	27
34	67644.76	73649.07	91847.40	108876.24	135779.03	147831.11	26
35	67666.18	73629.39	91901.04	108812.69	135815.32	147784.31	25
36	67687.60	73609.71	91954.71	108749.18	135851.64	147737.55	24
37	67709.01	73590.02	92008.41	108685.71	135888.00	147690.84	23
38	67730.41	73570.32	92062.14	108622.28	135924.38	147644.17	22
39	67751.81	73550.61	92115.90	108558.89	135960.80	147597.54	21
40	67773.20	73530.90	92169.68	108495.54	135997.25	147550.95	20
41	67794.59	73511.18	92223.50	108432.23	136033.72	147504.40	19
42	67815.97	73491.46	92277.34	108368.96	136070.23	147457.90	18
43	67837.34	73471.73	92331.22	108305.73	136106.77	147411.44	17
44	67858.71	73451.99	92385.12	108242.54	136143.34	147365.01	16
45	67880.07	73432.25	92439.05	108179.39	136179.95	147318.64	15
46	67901.43	73412.50	92493.01	108116.28	136216.58	147272.30	14
47	67922.78	73392.75	92547.00	108053.21	136253.24	147226.00	13
48	67944.13	73372.99	92601.01	107990.18	136289.94	147179.75	12
49	67965.47	73353.22	92655.06	107927.18	136326.67	147133.53	11
50	67986.81	73333.45	92709.14	107864.23	136363.43	147087.36	10
51	68008.14	73313.67	92763.24	107801.32	136400.22	147041.23	9
52	68029.46	73293.88	92817.38	107738.44	136437.04	146995.14	8
53	68050.78	73274.09	92871.54	107675.61	136473.89	146949.10	7
54	68072.09	73254.29	92925.73	107612.82	136510.78	146903.09	6
55	68093.39	73234.48	92979.96	107550.06	136546.70	146857.13	5
56	68114.69	73214.67	93034.21	107487.34	136584.64	146811.20	4
57	68135.99	73194.85	93088.49	107424.67	136621.62	146765.32	3
58	68157.28	73175.03	93142.80	107362.03	136658.63	146719.48	2
59	68178.56	73155.20	93197.14	107299.43	136695.67	146673.68	1
60	68199.84	73135.37	93251.51	107236.87	136732.75	146627.92	0

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43	Sinus		Tangens		Secans		
0	68199.84	73135.37	93251.51	107236.87	136732.75	146627.92	60
1	68221.11	73115.53	93305.91	107174.35	136769.85	146582.20	59
2	68242.37	73095.68	93360.34	107111.87	136806.99	146536.52	58
3	68263.63	73075.83	93414.79	107049.43	136844.16	146490.88	57
4	68284.88	73055.97	93469.28	106987.02	136881.36	146445.29	56
5	68306.13	73036.10	93523.80	106924.66	136918.59	146399.73	55
6	68327.37	73016.23	93578.34	106862.33	136955.86	146354.22	54
7	68348.61	72996.35	93632.92	106800.04	136993.15	146308.75	53
8	68369.84	72976.46	93687.53	106737.79	137030.48	146263.31	52
9	68391.07	72956.57	93742.16	106675.58	137067.84	146217.92	51
10	68412.29	72936.67	93796.83	106613.41	137105.23	146172.57	50
11	68433.50	72916.77	93851.52	106551.28	137142.66	146127.26	49
12	68454.71	72896.86	93906.25	106489.18	137180.11	146081.98	48
13	68475.91	72876.94	93961.01	106427.13	137217.60	146036.75	47
14	68497.11	72857.02	94015.79	106365.11	137255.12	145991.56	46
15	68518.30	72837.09	94070.61	106303.13	137292.68	145946.41	45
16	68539.48	72817.16	94125.45	106241.19	137330.26	145901.30	44
17	68560.66	72797.22	94180.33	106179.29	137367.88	145856.23	43
18	68581.83	72777.27	94235.23	106117.42	137405.53	145811.20	42
19	68603.00	72757.32	94290.17	106055.60	137443.21	145766.21	41
20	68624.16	72737.36	94345.13	105993.81	137480.92	145721.27	40
21	68645.32	72717.40	94400.13	105932.06	137518.67	145676.36	39
22	68666.47	72697.43	94455.16	105870.34	137556.45	145631.49	38
23	68687.61	72677.45	94510.21	105808.67	137594.26	145586.66	37
24	68708.75	72657.47	94565.30	105747.03	137632.10	145541.87	36
25	68729.88	72637.48	94620.42	105685.44	137669.98	145497.12	35
26	68751.01	72617.48	94675.56	105623.88	137707.89	145452.41	34
27	68772.13	72597.48	94730.74	105562.35	137745.83	145407.74	33
28	68793.24	72577.47	94785.95	105500.87	137783.80	145363.11	32
29	68814.35	72557.46	94841.19	105439.42	137821.81	145318.52	31
30	68835.45	72537.44	94896.46	105378.01	137859.85	145273.97	30

43	Sinus		Tangens		Secans		
30	68835.45	72537.44	94896.46	105378.01	137859.85	145273.97	30
31	68856.55	72517.41	94951.76	105316.64	137897.92	145229.46	29
32	68877.64	72497.38	95007.09	105255.31	137936.02	145184.98	28
33	68898.73	72477.34	95062.45	105194.01	137974.16	145140.55	27
34	68919.81	72457.29	95117.84	105132.75	138012.33	145096.16	26
35	68940.89	72437.24	95173.26	105071.53	138050.53	145051.81	25
36	68961.96	72417.18	95228.71	105010.34	138088.77	145007.49	24
37	68983.02	72397.12	95284.20	104949.20	138127.04	144963.22	23
38	69004.07	72377.05	95339.71	104888.09	138165.34	144918.98	22
39	69025.12	72356.98	95395.26	104827.02	138203.67	144874.78	21
40	69046.17	72336.90	95450.83	104765.98	138242.04	144830.63	20
41	69067.21	72316.81	95506.44	104704.98	138280.44	144786.51	19
42	69088.24	72296.71	95562.08	104644.02	138318.87	144742.43	18
43	69109.27	72276.61	95617.74	104583.10	138357.34	144698.39	17
44	69130.29	72256.51	95673.44	104522.21	138395.84	144654.39	16
45	69151.31	72236.40	95729.17	104461.36	138434.37	144610.43	15
46	69172.32	72216.28	95784.94	104400.55	138472.94	144566.51	14
47	69193.32	72196.15	95840.73	104339.77	138511.54	144522.62	13
48	69214.32	72176.02	95896.55	104279.04	138550.17	144478.78	12
49	69235.31	72155.88	95952.41	104218.33	138588.83	144434.97	11
50	69256.30	72135.74	96008.29	104157.67	138627.53	144391.20	10
51	69277.28	72115.59	96064.21	104097.04	138666.26	144347.48	9
52	69298.25	72095.44	96120.16	104036.45	138705.03	144303.79	8
53	69319.22	72075.28	96176.14	103975.89	138743.83	144260.13	7
54	69340.18	72055.11	96232.15	103915.37	138782.66	144216.52	6
55	69361.14	72034.94	96288.19	103854.89	138821.53	144172.95	5
56	69382.09	72014.76	96344.27	103794.45	138860.42	144129.41	4
57	69403.04	71994.57	96400.37	103734.04	138899.36	144085.91	3
58	69423.98	71974.38	96456.51	103673.67	138938.32	144042.46	2
59	69444.91	71954.18	96512.68	103613.33	138977.32	143999.04	1
60	69465.84	71933.98	96568.88	103553.03	139016.36	143955.65	0

44	Sinus		Tangens		Secans		
0	69465.84	71933.98	96568.88	103553.03	139016.36	143955.65	60
1	69486.76	71913.77	96625.11	103492.77	139055.43	143912.31	59
2	69507.67	71893.55	96681.37	103432.54	139094.53	143869.00	58
3	69528.58	71873.33	96737.67	103372.35	139133.66	143825.74	57
4	69549.49	71853.10	96794.00	103312.20	139172.83	143782.51	56
5	69570.39	71832.87	96850.35	103252.08	139212.03	143739.32	55
6	69591.28	71812.63	96906.74	103191.99	139251.27	143696.16	54
7	69612.17	71792.38	96963.16	103131.95	139290.54	143653.05	53
8	69633.05	71772.13	97019.62	103071.94	139329.85	143609.97	52
9	69653.92	71751.87	97076.10	103011.96	139369.18	143566.93	51
10	69674.79	71731.61	97132.62	102952.03	139408.56	143523.93	50
11	69695.65	71711.34	97189.17	102892.12	139447.96	143480.97	49
12	69716.51	71691.06	97245.75	102832.26	139487.40	143438.05	48
13	69737.36	71670.78	97302.36	102772.43	139526.88	143395.16	47
14	69758.21	71650.49	97359.01	102712.63	139566.39	143352.31	46
15	69779.05	71630.19	97415.69	102652.87	139605.93	143309.50	45
16	69799.88	71609.89	97472.40	102593.15	139645.51	143266.72	44
17	69820.71	71589.58	97529.14	102533.46	139685.12	143223.99	43
18	69841.53	71569.27	97585.91	102473.81	139724.77	143181.29	42
19	69862.34	71548.95	97642.72	102414.19	139764.45	143138.63	41
20	69883.15	71528.63	97699.56	102354.61	139804.16	143096.00	40
21	69903.96	71508.30	97756.43	102295.06	139843.91	143053.42	39
22	69924.76	71487.96	97813.33	102235.55	139883.69	143010.87	38
23	69945.55	71467.62	97870.27	102176.08	139923.51	142968.36	37
24	69966.33	71447.27	97927.24	102116.64	139963.36	142925.88	36
25	69987.11	71426.91	97984.24	102057.23	140003.25	142883.44	35
26	70007.89	71406.55	98041.27	101997.86	140043.17	142841.04	34
27	70028.66	71386.18	98098.33	101938.53	140083.13	142798.68	33
28	70049.42	71365.81	98155.43	101879.23	140123.12	142756.36	32
29	70070.18	71345.43	98212.56	101819.97	140163.15	142714.07	31
30	70090.93	71325.05	98269.73	101760.74	140203.21	142671.82	30

44	Sinus		Tangens		Secans		
30	70090.93	71325.05	98269.73	101760.74	140203.21	142671.82	30
31	70111.67	71304.66	98326.92	101701.55	140243.30	142629.61	29
32	70132.41	71284.26	98384.15	101642.39	140283.43	142587.43	28
33	70153.14	71263.85	98441.41	101583.26	140323.60	142545.29	27
34	70173.87	71243.44	98498.71	101524.17	140363.80	142503.19	26
35	70194.59	71223.02	98556.03	101465.12	140404.03	142461.12	25
36	70215.30	71202.60	98613.39	101406.10	140444.30	142419.09	24
37	70236.01	71182.17	98670.79	101347.12	140484.60	142377.10	23
38	70256.71	71161.74	98728.21	101288.17	140524.94	142335.14	22
39	70277.41	71141.30	98785.67	101229.25	140565.32	142293.23	21
40	70298.10	71120.86	98843.16	101170.37	140605.73	142251.34	20
41	70318.79	71100.41	98900.69	101111.53	140646.17	142209.50	19
42	70339.47	71079.95	98958.25	101052.72	140686.65	142167.69	18
43	70360.14	71059.48	99015.84	100993.94	140727.17	142125.92	17
44	70380.81	71039.01	99073.46	100935.20	140767.72	142084.18	16
45	70401.47	71018.54	99131.12	100876.49	140808.31	142042.48	15
46	70422.13	70998.06	99188.81	100817.82	140848.93	142000.82	14
47	70442.78	70977.57	99246.54	100759.18	140889.58	141959.19	13
48	70463.42	70957.07	99304.29	100700.58	140930.28	141917.61	12
49	70484.06	70936.57	99362.08	100642.01	140971.00	141876.05	11
50	70504.69	70916.07	99419.91	100583.47	141011.77	141834.54	10
51	70525.32	70895.56	99477.77	100524.97	141052.56	141793.05	9
52	70545.94	70875.04	99535.66	100466.51	141093.40	141751.61	8
53	70566.55	70854.51	99593.58	100408.07	141134.27	141710.20	7
54	70587.16	70833.98	99651.54	100349.68	141175.17	141668.83	6
55	70607.76	70813.45	99709.53	100291.31	141216.11	141627.49	5
56	70628.35	70792.91	99767.56	100232.98	141257.09	141586.19	4
57	70648.94	70772.36	99825.62	100174.69	141298.10	141544.93	3
58	70669.53	70751.80	99883.71	100116.42	141339.15	141503.70	2
59	70690.11	70731.24	99941.84	100058.19	141380.24	141462.51	1
60	70710.68	70710.68	100000.00	100000.00	141421.36	141421.36	0

GEOMETRIÆ TRIANGVLORVM LIBER III.

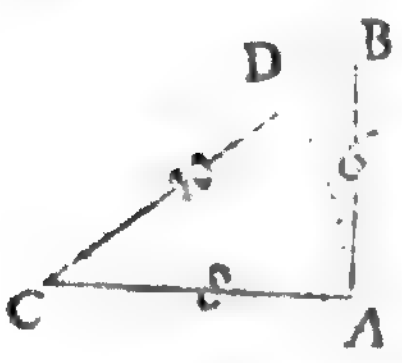
De Rectilineorum Triangulorum Calculo.

1.

ANON Triangulorum compositus, facilem rectilineorum, Sphæricorumque Triangulorum Calculum suppeditat.

Hæc est tertia pars Triangulorum Geometriæ: Canonis Triangulorum compositi usum ostendens, eumque duplicem. Priorem in rectilineorum Triangulorum: Alterum in Sphæricorum Triangulorum Calculo.

2. Triangulum rectilineum, est figura in planicie, tribus rectis lineis, quæ finibus suis se mutuo contingunt, conformata.



Talis est figura A B C: *est enim conformata in planicie, tribus rectis lineis* A B, A C & B C, *quæ finibus suis se mutuo contingunt.*

3. Triangulum rectilineum, rectangulum est, aut obliquangulum.

4. Triangulum rectilineum rectangulum est, quod angulum habet rectum.

Tale est in figura superiori Triangulum A B C: *habet enim angulum rectum ad* A.

5. Anguli rectilinei amplitudinem determinat comprehensus ab eo arcus, qui super vertice anguli ipsius velut centro describitur.

Sic in figura præmissa arcus A D, *descriptus centro* C, *mensurat amplitudinem anguli* B C A.

6. In

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6. In Triangulo rectangulo quadratum baſis eſt æquale quadratis laterum.

Baſis Trianguli rectanguli vocatur recta linea quæ angulum rectum ſubtendit: reliquæ verò rectum ambientes, latera dicuntur. Itaque in Triangulo ſuperiori A B C, *quadratum baſis* B C, *eſt æquale quadratis laterum* B A & C A: *cujus ratio ex penultima primi elem. manifeſta eſt.*

ΠΟΡΙΣΜΑΤΑ *duo.*

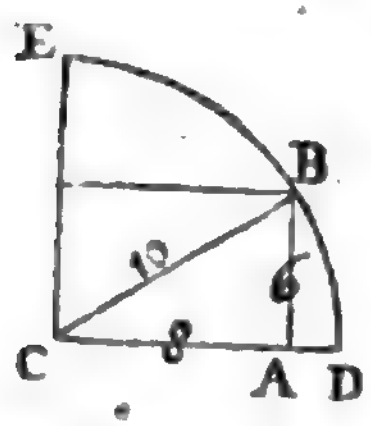
Itaque lateribus trianguli rectanguli cognitis, invenitur & baſis: collecta enim in unam ſummam laterum quadrata, componunt quadratum baſis, cujus radix quadrata eſt ipſa baſis quæſita.

In exemplo ſit latus A B 6; *& quadratum ejus* 36: A C 8, *& quadratum* 64; *erit* B C 10. *Iuncta enim ſimul quadrata* 36 *&* 64, *componunt quadratum* 100: *cujus radix quadrata eſt* 10, *pro* B C *baſi quæſita.*

Data vero baſi cum latere alterutro, manifeſtatur & reliquum latus: ſubducto enim quadrato lateris dati, ex quadrato baſis, relinquitur quadratum reliqui lateris; cujus radix quadrata eſt menſura lateris quæſiti.

In exemplo præmiſſo, deme quadratum lateris A C 64, *ex quadrato baſis* B C 100: *relinquitur quadratum lateris* A B 36; *& radix ejus* 6, *pro ipſo latere, ut ſupra. Item deme quadratum lateris* A B 36, *ex quadrato baſis* B C 100: *reſiduum erit quadratum lateris* A C 64; *& radix quadrata ejus* 8, *pro ipſo latere poſtulato.*

7. Si Trianguli rectanguli baſis aſſumatur ut circuli radius, latera ſinus recti ſunt oppoſitorum angulorum.



Eſto enim Triangulum rectangulum A B C, *in quo* B C *baſis aſſumatur ut circuli radius. Dico* B A *eſſe ſinum rectum anguli* B C A; *&* A C *ſinum rectum anguli* A B C. *Recta enim* B A *eſt perpendicularis à termino arcus* B *in ſemidiametrum* D A C. *Itaque per 7 primi hujus, Sinus rectus eſt arcus* D B *vel anguli* B C A *per 5 hujus. Eadem ratione recta* B E, *eſt ſinus rectus arcus* F B, *vel anguli*

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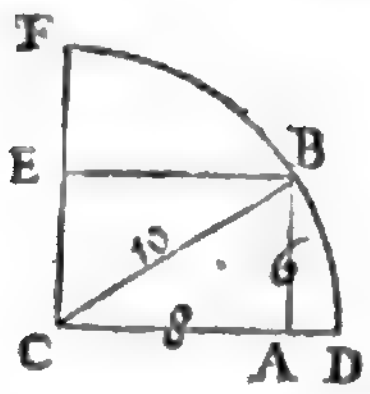


guli B C E. *Atqui per* 34 *primi*, A C *æquatur* B E; *& angulus* A B C, *æquatur angulo* B C E: *ergo* A C, *ſinus eſt anguli* A B C *oppoſiti.*

ΠΟΡΙΣΜΑΤΑ *quatuor.*

Primo itaque data baſi cum angulis inveniuntur latera. Nam ut radius ſe habet ad ſinum anguli; ita baſis ad latus ipſi angulo oppoſitum.

Exempli gratia, Sit baſis B C *partium* 10, *& angulus* B C A *partium* 36 52′ 11″, *&* A B C *prioris complementi partium* 53 7′ 49″, *Sinus autem* A B 6000000, *&* A C 8000000, *in ea menſura, in qua radius* B C *eſt* 10000000. *Invenientur latera* A B 6, *&* A C 8. *Nam per* 19 *Septimi Euclidis,*

Vt B C 10000000, *ad* A B 6000000: *Ita* B C 10, *ad* A B 6. *Item Vt* B C 10000000, *ad* A C 8000000: *Ita* B C 10, *ad* A C 8.

Secundo, data baſi cum latere alterutro, manifeſtantur anguli. Baſis enim eſt ad latus datum: ut radius ad ſinum anguli dicto lateri oppoſiti.

In eodem exemplo, detur B C 10, *&* A B 6: *Invenietur angulus* A C B *partium* 36 52′ 11″. *Nam per* 19 *Septimi Euclidis,*

Vt B C 10, *ad* A B 6: *Ita* B C 10000000, *ad* A B 6000000, *ſinum partium* 36 52′ 11″, *competentem angulo* A C B. *Itaque* A B C *reliquus angulus, eſt partium* 53 7′ 49″: *prioris ſcilicet complementum, ut ex* 7 *hujus, &* 32 *primi elementorum manifeſtum eſt.*

Tertio, dato latere alterutro, cum angulis, inveſtigatur latus reliquum. Sinus enim anguli dato lateri oppoſiti, eſt ad ſinum complementi ſui: ut latus datum, ad latus reliquum.

Detur in eodem exemplo angulus A C B *partium* 36 52′ 11″, *& ſinus ejus* 6000000: A B C *partium* 53 7′ 49″, *& ſinus ejus* 8000000, *cum latere* A B 6; *Dabitur* A C *reliquum latus* 8. *Nam per* 19 *Septimi Euclidis,*

Vt A B 6000000, *ad* A C 8000000: *Ita* A B 6, *ad* A C 8.

Quarto, datis angulis, & latere alterutro, addiſcitur baſis:

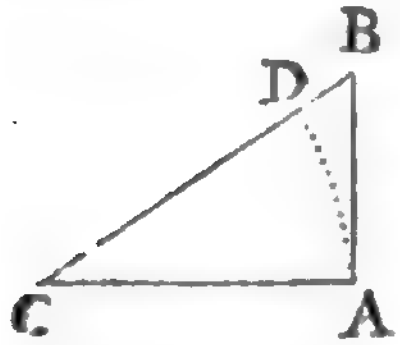
Sinus

Sinus enim anguli dato lateri oppositi, est ad radium: ut latus datum ad Basin.

Repetito & hic superiori exemplo, Detur A B 6, *& angulus ei oppositus* B C A *partium* 36 52′ 11″, *cum sinu ejus* 6000000. *Invenietur basis* B C *partium* 10. *Nam per* 19 *Septimi Euclidis,*

Vt A B 6000000, *ad* B C 10000000: *Ita* A B 6, *ad* B C 10.

8. Si Trianguli rectanguli latus alterutrum, ex acuto angulo, fiat circuli radius; reliquum est ejusdem anguli Tangens.



Esto rectangulum Triangulum A B C, *cujus latus* A C *fiat circuli radius ex acuto angulo* C. *Dico* A B, *tangentem esse anguli* A C B, *vel arcus* A D: *est enim perpendicularis extremo semidiametri* A, *in radium* C D *per arcus terminum* D *continuatum. Itaque per* 14 *Primi hujus, dicti anguli, vel arcus, Tangens est.*

ΠΟΡΙΣΜΑΤΑ *duo.*

Primo igitur, dato latere alterutro cum angulis, invenitur reliquum latus. Radius enim est ad tangentem anguli lateri quæsito oppositi: ut latus datum ad latus reliquum.

Exempli gratia detur latus A B 6: *& angulus* A B C *part.* 53 7′ 49″, *fiatque* A B *radius: erit* A C *Tangens anguli* A B C *ex Canone Tangentium* 13333333 *paulo plus; & latus* A C *reliquum* 8. *Nam per* 19 *Septimi Euclidis,*

Vt A B 10000000, *ad* A C 13333333 *paulo plus: Ita* A B 6, *ad* A C 8, *Omnino ut supra.*

Secundo, dato utroque latere, investigantur anguli. Nam ut latus alterum est ad latus reliquum; ita radius ad tangentem anguli reliquo lateri oppositi.

In exemplo detur latus A B 6: *& reliquum latus* A C 8. *Invenietur angulus* A B C *lateri* A C *oppositi, partium* 53 7′ 49″. *Nam per* 19 *Septimi Euclidis,*

Vt A B 6, *ad* A C 8: *Ita* A B 10000000, *ad* A C 13333333 *paulo plus, Tangentem anguli* A C B, *oppositi lateri* A C; *qui ex Tangentium Canone invenitur partium* 53 7′ 49″. *Ergo reliquus angulus* B C A *est partium* 36. 52′. 11″.

9. Si Tri-

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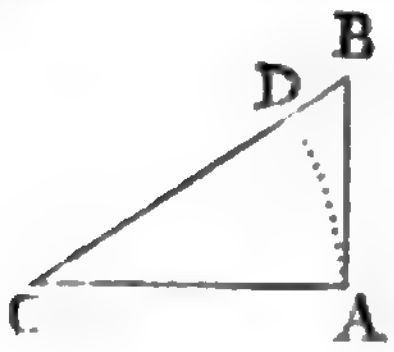
9. Si Trianguli rectanguli latus alterutrum eſt anguli tangens, baſis eſt anguli ejuſdem ſecans.



Repetita præmiſſi Theorematis figura, Sit A B *Latus, Tangens anguli* B C A. *Dico Baſim* B D C *eſſe ejuſdem anguli Secantem: eſt enim ducta per terminum peripheriæ* A D *in Tangentem* A B. *Itaque per* 19 *primi hujus, Secans eſt peripheriæ* A D, *vel anguli* B C A.

ΠΟΡΙΣΜΑΤΑ *tria.*

Primo ergo, dato latere alterutro, cum angulis, manifeſtatur baſis. Radius enim eſt ad ſecantem anguli dati: ut latus eidem angulo adjacens ad Baſin.

Exempli loco detur latus A C 8; *& angulus* B C A *Dato lateri adjacens, partium* 36 52′ 11″: *ſecans ejus* 12500000, *erit Baſis* B C 10. *Nam per* 19 *Septimi Euclidis,*

Vt A C 10000000, *ad* B C 12500000: *Ita* A C 8, *ad* B C 10.

Secundo, dato latere alterutro & Baſi, exquiruntur anguli. Nam ut latus alterutrum ad Baſim: ita radius eſt ad ſecantem anguli lateri dato adjacentis.

In exemplo eodem, detur latus A C 8, *& baſis* B C 10: *erit angulus* B C A *partium* 36 52′ 11″. *Nam per* 19 *Septimi Euclidis,*

Vt A C 8, *ad* B C 10: *Ita* A C 10000000, *ad* B C 12500000, *Secantem anguli* B C A, *lateri dato* A C *adjacentis. Inveniturque ex Canone ſecantium partium* 36 52′ 11″: *ergo reliquus* A B C, *eſt partium* 53 7′ 49″.

Tertio datis angulis & Baſi, inveniuntur latera. Nam ſecans anguli dati eſt ad radiū: ut baſis ad latus dato angulo adjacens.

Sit iterum exempli loco angulus B C A *partium* 36. 52′ 11″, *& Secans ejus è Canone Secantium* 12500000: *Baſis* B C 10; *erit* A C *latus angulo dato adjacens* 8. *Nam per* 19 *Septimi Euclidis,*

Vt B C 12500000, *ad* A C 10000000: *Ita* B C 10, *ad* A C 8

Rurſus detur Secans anguli A B C *partium* 53. 7′. 49″. 16666666: *& baſis* B C 10; *erit* A B 6. *Nam per* 19 *Septimi Euclidis,*

Vt B C 16666666, *ad* A B 10000000: *Ita* B C 10, *ad* A B 6.

Et ſic Triangulorum Rectangulorum Calculum abſolvimus. Sequitur

Obliquangulorum Triangulorum Calculus.

10. Triangulum rectilineum obliquangulum eſt, cujus tres anguli obliqui ſunt.

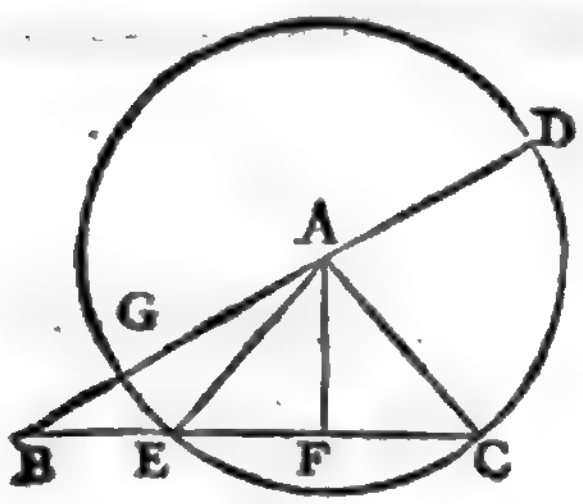
Tale eſt in adjuncto ſchemate triangulum A B C, *ejus enim anguli omnes obliqui ſunt.*

11. Obliquus angulus eſt qui acutus eſt aut obtuſus.

12. Acutus angulus eſt qui recto minor eſt: obtuſus qui recto major.

Ita in ſuperiori figura angulus ad B *&* C *eſt acutus, eſt enim uterque recto minor: angulus verò ad* A *obtuſus eſt, quia recto major eſt.*

13. Si trianguli obliquanguli latus minus fiat circuli radius, & ex ejus angulari puncto deſcribatur circulus, baſin & latus majus ſecans; erit baſis ad ſummam laterum, ut ſegmentum lateris ad ſegmentum baſis.



Baſis trianguli obliquanguli vocatur latus majus: vel, ſi æquicrurium ſit, alterutrum crurium pro baſi aſſumptum. Sit ergo A B C *Triangulum obliquangulum, cujus latus minus* A C, *baſis* B C: *facto autem* A C *radio, ex* A *puncto angulari, deſcribatur circuli peripheria, ſecans baſim in* E, *reliquum latus in* G. *Dico baſim* B C, *eſſe ad ſummam laterum* B A *&* A C *vel* A D (A C *enim &* A D *radii ſunt, & proinde æquales per* 15 *Definitionem primi elementorum*) *ut* B G *lateris ſegmentum, ad* B E *ſegmentum Baſis. Rectæ enim* B D *&* B C *à* B *puncto extra circulum productæ ſecant circulum in* G *&* E. *Itaque per* 36 *Tertii elementorum, ut* B C *ad* B D: *Ita* B G *ad* B E. *quod erat demonſtrandum.*

ΠΟΡΙΣΜΑ.

Itaque tribus obliquanguli Trianguli lateribus datis, inveniuntur tres anguli. Nam ut baſis trianguli ad ſummam laterum, ita laterum differentia ad baſis ſegmentum: ſed ut baſis ſegmentum cum ſemiſſe reſidui, eſt ad latus majus; ita radius

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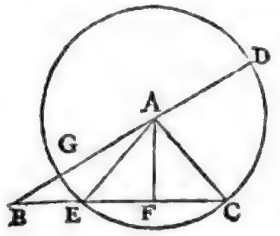
ad ſecantem anguli lateri minori adjacentis. Item ut ſemiſſis reſidui, eſt ad latus minus: ita radius ad ſecantem anguli lateri minori adjacentis. Dantur ergo duo anguli: quibus ex ſemicirculo ſubductis, relinquitur tertius baſi oppoſitus.



Retenta præcedentis Trianguli figura ſit baſis BC 28. *Latera vero* BA 25, AC 17: *& eorum ſumma* BD 42; *Differentia* BG 8: *erit* BE *ſegmentum Baſis* 12. *Nam*, *Vt* BC 28, *ad* BD 42: *Ita* BG 8, *ad* BE 12.

Subductum vero ſegmentum BE 12, *ex baſi* BC 28: *relinquit* EC 16; *cujus ſemiſſis* EF *vel* FC *eſt* 8 *(Perpendicularis enim* AF *biſecat* EC *per tertiam tertii elementorum) hinc dantur anguli ad* B *&* C *per* 8 *hujus. Nam* BE *eſt* 12, *&* EF 8: *ergo tota* BF 20. *Baſis autem* BA *Trianguli rectanguli* BFA *eſt* 25. *Itaque*

Vt BF 20, *ad* BA 25: *Ita* BF 10000000, *ad* BA 12500000, *ſecantem anguli ad* B *partium* 36° 52′ 11″. *Rurſus in Triangulo* AFC *rectangulo datur latus* FC 8, *& baſis* AC 17: *ergo*

Vt FC 8, *ad* AC 17: *Ita* FC 10000000, *ad* AC 21250000, *ſecantem anguli ad* C *partium* 61 55′ 39″.

Iam cum anguli ad C *&* B *noti ſint, non poteſt latêre reliquus ad* A: *eſt enim reſiduus duorum ad ſemicirculum, per* 32 *primi elementorum. Dempto igitur utroque ex ſemicirculi partibus* 180: *relinquitur ipſe angulus quæſitus, partium* 81 12′ 10″.

Atque ita ex tribus obliquanguli Trianguli lateribus datis, tres anguli inventi ſunt: quod erat oſtendendum.

14. In Triangulo obliquangulo proportio lateris ad latus eſt: ut proportio ſinus recti anguli alteri lateri oppoſiti, ad ſinum rectum anguli reliquo lateri oppoſiti; & contra.

Sit Triangulum ABC *obliquangulum, laterum inæqualium (nam ſi latera æqualia ſint, anguli oppoſiti per* 5 *primi element. æquantur: itaque & ſinus eorum æquales ſunt per* 29 *tertii Element.) Dico* BA *latus eſſe, ad* AC *latus: ut ſinus rectus anguli* ACB, *ad ſinum rectum anguli* ABC. *Continuetur*

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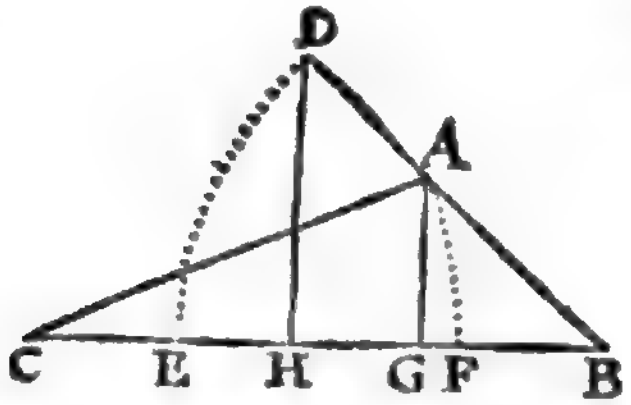
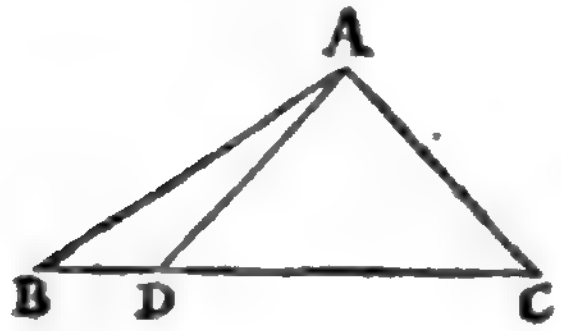


tinuetur enim B A *latus in* D, *ut æquale ſit lateri* A C : *deſcriptiſque peripheriis* D E *&* A F *æqualibus radiis* C A *&* B D, *dimittantur ex* D *&* A *arcuum terminis perpendiculares in baſim* B C ; *ſintque* D H *&* A G *ſinus recti ſcilicet angulorum* C *&* B, *vel arcuum* A F *&* D H *per 7 primi hujus. Erit per 4 ſexti elementorum, ut* B A *ad* B D, *hoc eſt* A C : *Ita* A G *ſinus rectus anguli oppoſiti, ad* D H *ſinum rectum anguli oppoſiti : quod erat demonſtrandum. Converſa hujus Theorematis eodem modo demonſtratur. Nam quia* B A *latus unum eſt ad* B D *latus alterum: ut* A G *ſinus angulo* C *oppoſiti, ad* D H *ſinum anguli oppoſiti ; eſt etiam, per elementum citatum,* A G *ſinus anguli* C, *ad* D H *ſinum anguli* B ; *ut oppoſitum latus* A B, *ad oppoſitum latus* D H, *id eſt,* B C. *Quod etiam demonſtrandum erat. Obſerva autem hoc Theorema verum eſſe non modo in omnibus rectilineis Triangulis, ſed & Sphæricis, quemadmodum ſuo loco demonſtrabitur.*

ΠΟΡΙΣΜΑΤΑ *duo.*

Itaque datis duobus obliquanguli Trianguli lateribus, & angulo non ab iis comprehenſo obtuſo (aut ſi acuto data anguli ſpecie alteri lateri oppoſiti) anguli reliqui, & latus tertium invenitur. Nam ut latus alterutrum dato angulo oppoſitum eſt ad ſinum anguli dati : ita latus alterum, ad ſinum anguli oppoſiti. Dantur ergo duo anguli ; quibus ex ſemicirculo ablatis, relinquitur tertius. quare ut ſinus anguli alterutrius noti, ad alterutrum latus oppoſitum; ita ſinus anguli tertii, ad latus tertiũ.



Detur in Triangulo A B C *obliquangulo, latus* A B 25 ; A C 17 : *& angulus* A B C *non ab iis comprehenſus acutus partium* 36 52' 11" ; *cum acuta ſpecie anguli ad* C *ignoti. Invenietur ipſe angulus ad* C *partium* 61 55' 39". *Nam per* 19 *Septimi Euclidis,*

Vt latus A C 17, *ad ſinum anguli* A B C 6000000 : *Ita* A B *latus* 25, *ad ſinum anguli* A C B 8823529.

Cujus arcus è ſinuum Canone datur partium 61 55' 39", *quia ſpecies anguli acuta eſt : nam ſi obtuſa eſſet, angulus exiſteret partium* 118 4' 21". *Quod ut manifeſtum fiat, ducatur ex* A *recta* A D *in baſin* B C, *æqualis* A C :

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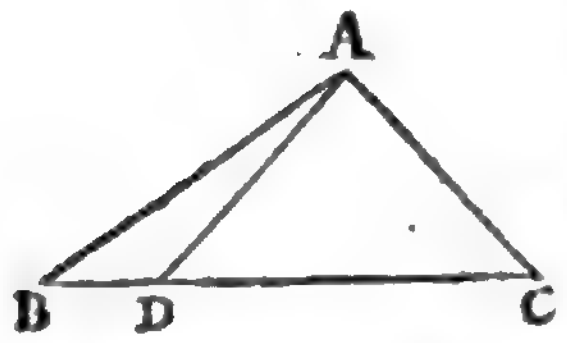

lis A C: *erit* A D C *Triangulum æquicrurum, & angulus* A D C *per* 5 *primi element. æqualis angulo* A C D; *exterior autem* A D B *per* 13 *ejuſdem, erit reliquus ad ſemicirculum. Quare ut latus* B A *ſubtendit duplicem angulum,* A D B *obtuſum; &* A C B *acutum: Ita etiam ſinus inventus, per* 7 *primi hujus eſt dimidium peripheriarum, minoris circuli quadrante, & reliquæ ad ſemiperipheriam. Patet igitur definiendam eſſe anguli ſpeciem dato angulo acuto exiſtente. Alia vero eſt ratio, cum angulus obtuſus datur: nam tum manifeſtum eſt, reliquos Trianguli angulos acutos eſſe. Duo enim obtuſi anguli in Triangulo plano eſſe nequeunt, cum omnes Trianguli anguli per* 32 *primi element. æquales ſint duobus rectis. Itaque ſpecies anguli tunc per ſe data eſt, nempe acuta.*

Porro cum in Triangulo A B C *duo anguli noti ſint,* A B C & A C B, *non poteſt latere tertius* B A C: *eſt enim per* 32 *primi elementorum, reſiduus duorum datorum ad ſemicirculum, partium ſcilicet* 81 12′ 10″. *Itaque tertium latus inde innoteſcit. Nam*

Vt ſinus anguli A B C 6000000, *ad latus* A C 17: *Ita ſinus anguli* B A C 9882353, *ad latus* B C 28. *vel,*

Vt ſinus anguli A C B 8823529, *ad latus* A B 25: *Ita ſinus anguli* B A C 9882353, *ad latus* B C 28.

Secundo, datis duobus Trianguli obliquanguli angulis, & uno latere, manifeſtatur angulus tertius, cum reliquis lateribus. Subductis enim duobus angulis datis ex ſemicirculo, relinquitur tertius. quare ut ſe habet ſinus anguli lateri dato oppoſiti ad latus datum: ita etiam reliquorum angulorum ſinus ad latera oppoſita.

Sit & hic Triangulum obliquangulum A B C, *cujus duo anguli* A B C 36 52′ 11″: & A C B 61 55 39 *dentur; cum latere* B C 28. *Invenietur reliquus angulus* B A C, *cum lateribus* B A & A C. *Demptis enim angulis datis ex ſemicirculo, relinquitur angulus tertius* B A C, *partium* 81 12′ 10″. *Itaque per* 19 *ſeptimi Euclidis,*

Vt ſinus anguli B A C 9882352, *ad latus* B C 28: *Ita ſinus anguli* A B C 6000000, *ad latus* A C 17. *Item*

Vt ſinus anguli B A C 9882352, *ad latus* B C 28: *Ita ſinus anguli* A C B 8823529, *ad latus* A B 25. *vel*

Vt

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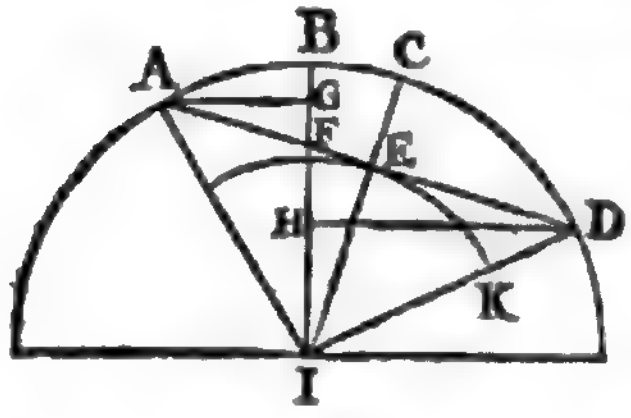
Vt ſinus anguli A B C 6000000, *ad latus* A C 17 : *Ita ſinus anguli* A C B 8823529, *ad latus* A B 25.

15. Si angulorum duorum ſumma detur, quorum ſinuum ratio inter ſe conſtet, ipſi etiam anguli ſecernuntur. Nam ut ſemiſſis ſummæ ſinuum rationis, ad differentiam ſemiſſis, & termini rationis ſinuum alterutrius eſt: ita tangens ſummæ angulorum, ad tangentem anguli; quo minor quæſitus ab angulorum ſummæ ſemiſſe deficit; major eam ſuperat.



Detur in adjecto diagrammate, ſumma angulorum A I B & B I D *part.* 40: *cum ratione ſinuum ut* A G *ad* D H (*vel per* 4 *ſexti elementorum ut* A F *ad* D F) *ut* 4 *ad* 7. *Dico utrumque angulum* A I B & B I D *ſigillatim datum iri. Egrediatur enim ex* I *recta, biſecans* A D, *rationis ſinuum ſummam datam in* E: *erit* A E 5 $\frac{r}{i}$, & *angulus* A I E *partium* 20, *æqualis angulo* D I E; F E *vero* (*differentia termini minoris* A F 4, & A E 5 $\frac{s}{i}$ *vel* E D 5 $\frac{t}{i}$ & F D *termini majoris* 7) 1 $\frac{t}{i}$. *Fiat quoque* I E *radius, ut* D E *tangens ſit anguli* D I E, *vel arcus* K E *partium* 20: *hinc enim dabitur tangens* E F *anguli* E I F *vel* B I C *ſubtendens. Nam per* 19 *ſeptimi Euclidis*

Vt D E 5 $\frac{t}{i}$, *ad* D E *tangentem ang.* D I E 3639702: *Ita* F E 1 $\frac{t}{i}$, *ad* F E *tang. anguli* E I F, 992646

Cujus arcus è Tangentium Canone datur partium 5 40′ 8″ *fere. Atqui hoc angulo major eſt angulus* B I D *major: minor vero angulus* A I B *minor. Ergo* B I D *angulus eſt partium* 25 40′ 8″ *fere:* A I B *partium* 14 19′ 52″ : *Quod erat demonſtrandum.*

ΠΟΡΙΣΜΑ.

Itaque duobus obliquanguli Trianguli lateribus datis, & angulo ab iis comprehenſo, inveniuntur anguli reliqui, & latus tertium. Nam ut ſemiſſis ſummæ laterum datorum, ad differentiam ſummæ ſemiſſis, & lateris alterutrius: Sic tangens ſemiſſis reſidui anguli ad ſemicirculum, ad Tangentem anguli, quo angulus minori lateri oppoſitus eâdem ſemiſſe minor, ma-

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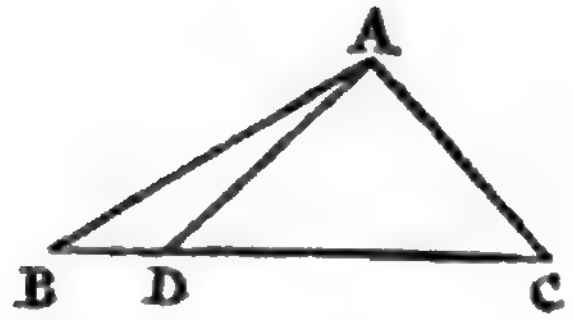
jori major eſt. Dantur ergo tres anguli. Quare, ut ſinus alterutrius anguli, ad latus oppoſitum: ita ſinus anguli quæſito oppoſiti, ad latus quæſitum.



Retenta ſuperioris Trianguli figura, ſit latus A B 25; B C 28: *& angulus* A B C *partium* 36 52′ 11″. *Invenientur reliqui anguli* B A C, *&* A C B *cum tertio latere* A C. *Nam per* 32 *primi elementorum, ex angulo* B *noto, datur ſumma angulorum* B A C *&* A C B, *partium* 143 7′ 48″, *reſiduum ſcilicet anguli dati ad ſemicirculum: item ex lateribus notis, datur ratio ſinuum angulorum oppoſitorum per* 13 *hujus. Itaque cum angulorum duorum ſumma detur, cum ratione ſinuum etiam uterque ſigillatim definitur. Nam*

Vt ſemiſſis ſummæ laterum 26 1/2. } *ad differentiam ſummæ ſemiſſis & lateris alterutrius* 1 1/2:

Sic Tangens ſemiſſis reſidui anguli, ad ſemicirculum partium 71 33′ 54″, *ſcilicet* 30000000 } *ad Tangentem* 1698112, *anguli partium* 9 38′ 15″, *quo angulus* A C B *minori lateri oppoſitus ſemiſſe reſidui anguli ad ſemicirculum minor eſt: reliquus* B A C *majori lateri oppoſitus major eſt. Itaque* A C B *eſt part.* 61 55′ 39″, B A C 81 11′ 9″. *ut ſupra.*

Latus A C *ex præmiſſo Theoremate invenitur* 17. *Nam*

Vt ſinus anguli B A C 9882352 *ad* B C *oppoſitum latus* 28 : *Ita ſinus anguli* A B C 6000000, *ad* A C *latus oppoſitum* 17.

Et ſic calculum rectilineorum Triangulorum expoſuimus, cujus uſus eſt in omni magnitudinum genere dimetiendo. Supereſt tantum ut in eo Mathematum ſtudioſus ſedulo ſe exerceat. Theoremata enim ſunt pro inventione cujuſvis quarti in Triangulo rectilineo datis tribus, idque per 19 *ſeptimi Euclidis, i. regulam proportionum.*

Etſi vero ſuperior doctrina tam clare propoſita ſit, ut ulterius explicari non ſit opus: quo tamen promptior & expeditior ſit ejus uſus, ſubjungimus ſequentem diatypoſim, in qua tanquam in tabula doctrinæ ſuperioris ſummam exhibemus.

I N

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IN TRIANGVLO RECTANGVLO inveniuntur LATERA

Ex basi & angulis, *per 7 hujus.*

Vt I *radius,* II *ad sinum anguli quæsito lateri oppositi* } III *Ita Basis,* IIII *ad latus quæsitum.*

vel per 9 hujus.

Vt I *secans anguli quæsito lateri adjacens* } II *ad Radium* { III *Ita basis,* IIII *ad latus quæsitum.*

Ex angulis & latere alterutro, *per 7 hujus.*

Vt I *sinus anguli dato lateri oppositi* } II *ad sinum complementi sui* { III *Ita datum Latus,* IIII *ad latus reliquum.*

vel per 8 hujus.

Vt I *radius* II *ad Tangentem anguli dato lateri oppositi* { III *Ita datum latus,* IIII *ad latus reliquum.*

Ex basi & latere alterutro, *per 6 hujus.*

Minue quadratum lateris noti ex quadrato basis, relinquitur quadratum lateris reliqui: cujus tetragonica radix est pro ipso latere quæsito.

BASIS

BASIS

Ex utroque latere, *per 6 hujus.*

Adde in unam ſummam quadrata laterum, componitur quadratum Baſis: cujus radix quadrata ipſam Baſim manifeſtat.

Ex angulis & alterutro latere, *per 7 hujus.*

I *Vt ſinus anguli dato lateri oppoſiti* } II *ad radium* { III *Ita datum latus,* IIII *ad baſim.*

vel per 9 hujus,

I *Vt radius* } II *ad ſecantem anguli dato lateri adjacentis* { III *Ita datum latus,* IIII *ad baſim.*

ANGVLI

Ex baſi & latere alterutro, *per 7 hujus.*

I *Vt baſis* } II *ad latus datum* { III *Ita radius* } IIII *ad ſinum anguli dato lateri oppoſiti.*

vel per 9 hujus,

I *Vt latus datum* } II *ad baſin* { III *Ita radius* } IIII *ad ſecantem anguli dato lateri adjacentis.*

Ex utroque crure, *per 8 hujus.*

I *Vt latus* } II *ad latus reliquum* { III *Ita radius* } IIII *ad Tangentem anguli reliquo lateri oppoſiti.*

I N

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IN TRIANGVLO OBLIQVANGVLO inveniuntur

ANGVLI

Ex tribus lateribus, *per 13 hujus.*

Vt baſis Trianguli (I) } *ad ſemiſummam laterum* (II) { *Ita Laterum differentia* (III) } *ad baſis ſegmentum.* (IIII)

Vt Baſis ſegmentum cum ſemiſſe reſidui } *ad latus majus* { *Ita radius* } *ad ſecantem anguli lateri majori adjacentis.*

Vt ſemiſſis reſidui } *ad latus minus* { *Ita radius* } *ad ſecantem anguli lateri minori adjacentis.*

Datur jam duo anguli: Tertius eſt horum duorum reſiduus ad ſemicirculũ.

LATVS ET ANGVLI DVO.

Ex duobus lateribus datis, & uno angulo obtuſo non ab iis comprehenſo: vel ſi acuto data ſpecie alterutrius anguli ignoti, *per* 14 *hujus.*

Vt latus datum dato angulo oppoſitum (I) } *ad ſinum anguli dati* (II) { *Ita latus alterum* (III) } *ad ſinum ang. oppoſiti minoris quadrante, ſi ſpecies anguli acuta ſit, majoris ſi obtuſa.*

Datur jam duo anguli: Tertius eſt horum duorum reſiduus ad ſemicirculum.

Vt ſinus anguli alterutrius noti } *ad latus oppoſitum* { *Ita ſinus anguli tertii* } *ad latus tertium.*

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ANGVLVS ET DVO LATERA,

Ex duobus angulis & uno latere, *per eandem.*

Tertius angulus est reliquus duorum datorum ad semicirculum. Itaque,

Vt I *sinus anguli dato lateri oppositi* } *ad* II *latus datum* { *Ita* III *sinus anguli secundi* } *ad latus oppositum.*

Vt sinus anguli alterutrius } *ad suum latus oppositum* { *Ita sinus anguli tertii* } *ad latus tertium.*

ANGVLI DVO ET LATVS

Ex duobus lateribus & angulo ab iis comprehenso, *per* 15 *hujus.*

Vt I *semissis summæ laterum datæ* } *ad* II *differentiam summæ semissis & lateris alterutrius:*

Ita III *Tangens semissis residui anguli ad semicirculum* } *ad Tangentem anguli, quo angulus lateri minori oppositus semisse dicti residui anguli ad semicirculum minor est: oppositus majori major est.*

Vt I *anguli alterutrius sinus* } *ad* II *latus oppositum* { *Ita* III *sinus anguli quæsito lateri oppositi* } *ad* IIII *latus quæsitum.*

GEOME-

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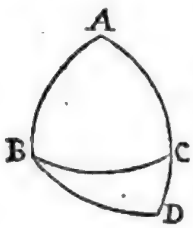
GEOMETRIÆ TRIANGVLORVM LIBER IIII.

De Calculo Triangulorum Sphæricorum.

1.

CANONIS Triangulorum compoſiti uſus alter eſt, in Calculo Triangulorum Sphæricorum.

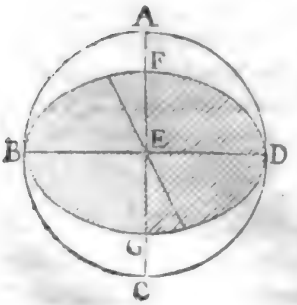
Superioris libri Theoremate primo, duplex nobis uſus Triangulorum Canonis indicatus eſt: prior in rectilineorum, poſterior in Sphæricorum Triangulorum Calculo. Prioris vero ratio præmiſſo tractatu nobis fuſe explicata eſt: Poſterioris demonſtratio hoc libro continetur.



2. Triangulum Sphæricum, eſt figura in ſphærica ſuperficie, trium maximorum Sphæræ arcuum concurſu, conformata.

Talis eſt in adjecto ſchemate, figura A B C, *vel* A B D.

3. Maximi Sphæræ circuli ſunt quibus unum Sphæræ centrum commune eſt.



4. Si maximus Sphæræ circulus tranſeat per maximi polos, ipſi normalis eſt: & contra.

Maximus circulus A B C D, *tranſeat per maximi circuli* B G D F *polos* A & D: *dico circulum* A B C D, *normalem eſſe circulo* B G D F. *Ducatur enim per centrum Sphæræ* E, *recta* B E D, *ad communem interſectionem planorum* B & D: *ſecetque eam alia recta* A E C *normaliter per centrum* E, & po-

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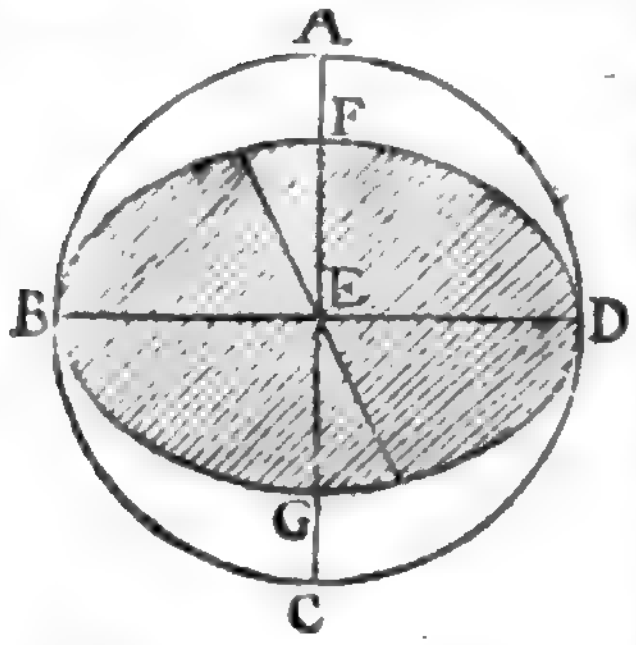


los A & C; *erit hæc per* 4 *undecimi Euclidis plano circuli* A B C D *normalis. Itaque per* 18 *ejusdem, planum circuli* A B C D, *i. ipse circulus* A B C D: *est normalis plano circuli* B G D F, *i. ipsi circulo* B G D F; *quod erat demonstrandum. Conversa ex eadem demonstratione perspicua est. Diameter enim* B E D, *secat axin* A E D *in* E *centro normaliter, per* 4 *undecimi Euclidis: puncta autem* A & D, *sunt poli circuli* B G D F, *ex poli definitione; per quos necessario transit circulus* A B C D, *per conversam decimæoctavæ undecimi elementorum. Itaque maximus Sphæræ circulus* A B C D, *maximo* B G D F *normalis, transit per polos ejus: quod erat demonstrandum.*

ΠΟΡΙΣΜΑΤΑ *duo.*

Itaque demissus à polo circuli maximi, in circumferentiam suam arcus, dictæ circumferentiæ normalis est.

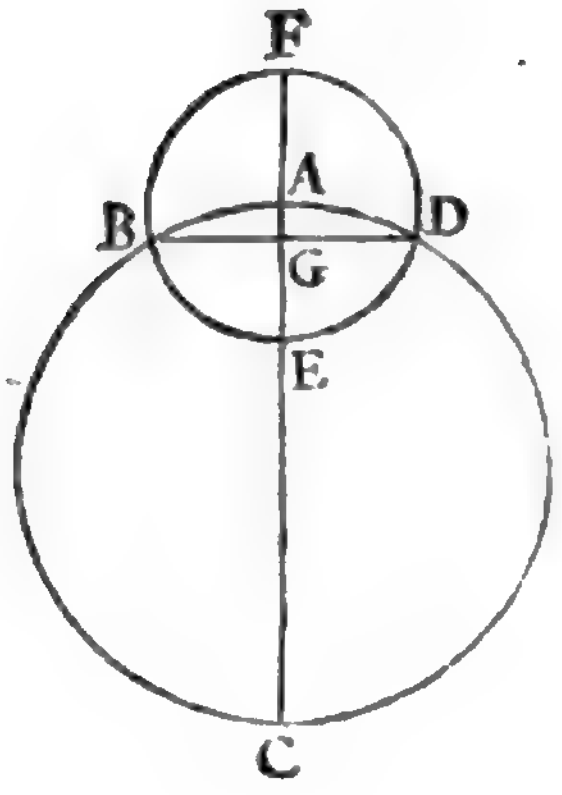
Sit enim in figura superiori A B *arcus maximi circulus, demissus in circumferentiam* B G D F *à polo ejusdem* A: *erit eidem normalis. Nam cum arcus* A B, *transeat* A *polum circuli* B G D F, *vel saltem in eo desinat, consequitur eidem normalem esse.*

Punctum vero concursus duorum arcuum maximi circuli, vel unius quadrantis terminus, normaliter è circulo maximo eductorum, est ejusdem circuli polus.

Sic in eodem diagrammate, A *punctum concursus duorum arcuum* B A & D A, *eductorum normaliter è circulo maximo* B G D F: *vel* A, *terminus quadrantis* B A *vel* D A *ex eodem circulo normaliter educti, est ejusdem circuli polus. Nam cum* B A & D A *sigillatim circulo* B G D F *normales sint ex thesi, necesse per polos transeunt, vel in polo concurrunt: & proinde punctum concursus arcuum* B A & D A, *vel terminus quadrantis alterutrius, est circuli* B G D F *polus.*

5. Si maximus Sphæræ circulus, transeat per minoris circuli polum, eidem normalis est.

Maximus Sphæræ circulus A B C D, *transeat per* A *polum circuli minoris* B E D F: *dico maximum minori normalem esse. Maximi enim*

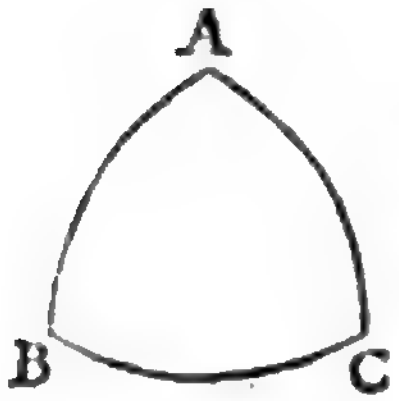


nim circuli diameter A E C, *eſt normalis diametro minoris* B G D *per* 3 *tertii elementorum. Itaque & circulus maximus* A B C D, *minimo* B E D F *normalis per* 18 *undecimi Euclidis: quod erat demonſtrandum.*

6. Triangulum Sphæricum, rectangulum eſt, aut obliquangulum.

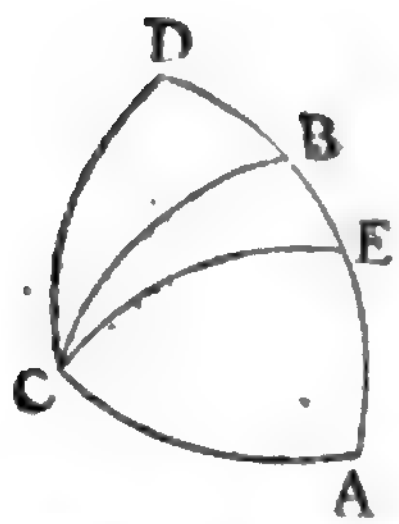
7. Rectangulum eſt quod angulum habet rectum.

8. Anguli amplitudinem in Sphærico Triangulo, menſurat arcus maximi circuli, ex angulo tanquam polo deſcriptus dictum angulũ ſubtendens.



Ita in adjuncta Diagrapha, arcus B C, *menſurat angulum* B A C: *eſt enim arcus magni circuli, ex angulo* A, *tanquam polo deſcriptus, ipſum angulum ſubtendens.*

9. Si Trianguli rectanguli latus alterum, ſit quadrans circuli, oppoſitus angulus rectus eſt; ſi quadrante majus, obtuſus; ſi minus, acutus; & contra.



Latus rectanguli Trianguli alterum, vocamus arcum alterutrum qui rectum angulum continet. Eſto igitur Triangulum Sphæricum A B C, *rectangulum ad* A: *Sitque* A B *latus circuli quadrans. Dico angulum* B C A *oppoſitum, rectum eſſe. Nam per ſecundum poriſma quarti hujus,* B *eſt polus circumferentiæ* C A: *per quem tranſit arcus* B C. *Itaque per primum poriſma ejuſdem, arcus* B C *eſt normalis circumferentiæ* C A: *& proinde angulus ad* C *rectus. Fiat vero* A D *latus quadrante majus, & arcus* A B *circuli quadrans: erit angulus* B C A *rectus, per primam hujus Theorematis partem; & proinde* D C A *obtuſus (angulus enim* D C A, *major eſt angulo* B C A) *tandem ſtatuatur latus* A E *quadrante minus, & arcus* A B

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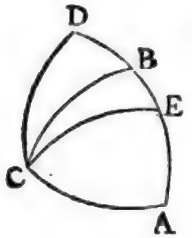
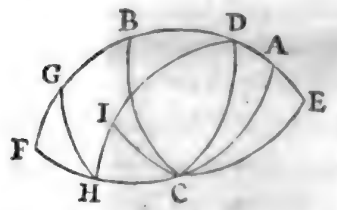


circuli quadrans: erit angulus B C A *rectus per primam partem hujus, major angulo* E C A; *& proinde angulus* E C A *acutus eſt.*

Converſa eadem ratione demonſtratur. ſint enim in eodem Triangulo, anguli B C A, *&* B A C *recti: erunt oppoſita latera* B A, *&* B C, *circuli quadrantes. Arcus enim* B A, *&* B C, *egredientes normaliter ex peripheria circuli maximi* C A, *concurrunt in* B, *ejuſdem polo, per ſecundum poriſma quarti hujus: ideoque quadrantes ſunt maximorum circulorum. Simili ratione demonſtratur* D A, *latus, majus eſſe circuli quadrante, ſi angulus ad* C *obtuſius ſit; minus, ſi acutus. Nam ſi angulus* D C A *conſtituatur obtuſius, erit* B C A *rectus, & proinde latus* D A *majus latere* B A *circuli quadrante: ſin* E C A *conſtituatur acutus, erit* B C A *rectus; & proinde* E A *minus* B A *quadrante: quod erat oſtendendum.*

10. Si trianguli rectanguli latus alterum ſit quadrans circuli, etiam baſis quadrans eſt; ſi vero utrumque latus quadrante circuli majus ſit, aut minus, baſis quadrante minor eſt: quod ſi latus unum circuli quadrante majus ſit, reliquum minus, baſis quadrante major eſt: & contra.



Theorematis hujus partes tres ſunt. Prima, baſin Trianguli rectanguli eſſe quadrantem circuli, ſi latus alterum ſit circuli quadrans; & contra. Eſto igitur Sphæricum Triangulum A B C, *rectangulum ad* A: *ſitque latus* A B *circuli quadrans. Dico* B C *baſin etiam circuli quadrantem eſſe. Nam per præmiſſum Theorema, angulus ad* C *rectus eſt: & proinde arcus* A B *&* C B, *normaliter egrediuntur ex* C A *circumferentia, concurrunt autem in* B *polo. Itaque per* 2 *poriſma quarti hujus, maximorum circulorum quadrantes ſunt.*

Converſa hujus partis perſpicua eſt. Sit enim angulus ad A *rectus, &* B C *circuli quadrans. Dico alterutrum laterum etiam circuli quadrantem eſſe: polo enim* B, *deſcribatur maximus circulus, ſecturus circumferentiam* B A *in* A; *vel ſupra* A *in* D; *infra in* E: *ſi ſecet in* A, *conſtat* B A *latus quadrantem eſſe per ſecundum poriſma quarti hujus. Si vero in* D, *aut* E *punctis, anguli ad* D *&* E *recti ſunt per primum poriſma ejuſdem: angulus autem ad*

A re-

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A rectus eſt ex Theſi ; quare per ſecundum poriſma ejuſdem , C eſt polus circumferentiæ B D A E , & latus C A circuli quadrans.

Secunda hujus Theorematis pars eſt : Baſin quadrante minorem eſſe , ſi utrumque Trianguli rectanguli latus, quadrante majus ſit , aut minus : & contra. Aſſumatur igitur & hic Triangulum A B C , rectangulum ad A : continuenturque latera A B & A C , in F oppoſitum polum ; componentur duo Triangula , A B C , & F B C , invicem æqualia. Ducto vero arcu G H , per puncta G & H : fiet G H baſis, communis Triangulo G A H rectangulo , habenti latera A G & A H , quadrante circuli A B , vel A C , majora ; Itemque Triangulo G F H rectangulo reliquo habenti latera F G & F H quadrante circuli F B vel F C minora ; baſis vero G H erit minor B C quadrante circuli : rectos angulos ad F , & A , per 8 hujus menſtrante. Secus enim ſi non ſit , vel major erit B C arcu , vel æqualis ipſi. Sed major eſſe nequit : quia Triangulum A B C , ad omnes angulos rectangulum , non poteſt capere latus recto majus. Aequalis eſſe nequit, quia neutrius Trianguli latus circuli quadrans eſt : conſequitur igitur baſin G H , quadrante minorem eſſe.

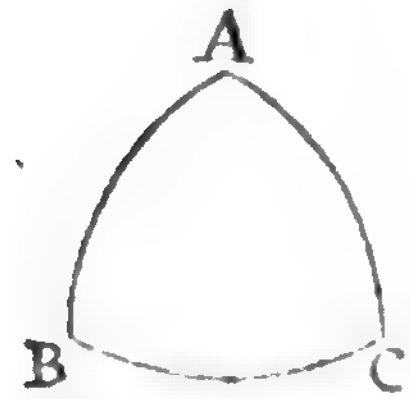
Converſa hujus partis etiam facilis eſt. Sit enim baſis quadrante minor : dico utrumque latus Trianguli rectanguli dati, quadrante majus, aut minus eſſe. Nam ſi non ſit ; unum quadrans eſt ; vel unum quadrante majus, & reliquum minus. Atqui ſi unum latus quadrans ſit: eſt & baſis quadrans. Vel ſi unum latus quadrante majus ſit, reliquum minus: baſis quadrante major eſt. Utrumque eſt contra Theſin. Ergo utrumque latus, vel quadrante majus, vel minus eſt. Prioris ratio ex prima hujus Theorematis parte clara eſt: poſterioris ex tertia: quæ docet,

Baſin quadrante circuli majorem eſſe , ſi unum rectanguli Trianguli latus ſit quadrante circuli majus , reliquum minus : & contra. Aſſumatur enim & hic Triangulum D A H , rectangulum ad A : cujus latus A D , ſit minus A B circuli quadrante ; & reliquum A H , majus A C circuli quadrante. Dico D H baſin, etiam quadrante circuli majorem eſſe: & contra. Arcus enim A C , eſt circuli quadrans ex fabrica : quemadmodum & D C per ſecundum poriſma quarti hujus. Quare ſi polo D , in C deſcribatur arcus maximi circuli C I ; ſecabit D H baſin in I , proinde D I quadrans erit , per citatum poriſma , & D H quadrante major.

Converſa hujus partis ſimiliter patet; latus alterum Trianguli rectanguli quadrante majus eſſe , reliquum minus , ſi baſis quadrante major ſit. Secus enim ſi non ſit : erunt latera vel circuli quadrantes ; & tunc baſis eſt quadrans, per primam hujus Theorematis partem : vel utrumque latus erit majus quadrante , vel minus , & tum baſis quadrante minor eſt , per ſecundam hujus Theorematis par-

partem. Sed utrumque eſt contra Theſin. Itaque latus unum quadrante majus; reliquum minus eſt: quæ fuere demonſtranda.

11. Si Trianguli rectanguli alterutĕr angulorum in baſi rectus ſit, baſis eſt circuli quadrans; ſin uterque vel acutus vel obtuſus ſit, baſis eſt quadrante minor: ſi vero alter eorum acutus ſit, & reliquus obtuſus, baſis quadrante major eſt: & contra.



Sit Triangulum A B C *rectangulum ad* C. *Dico* A B *baſin, circuli quadrantem eſſe, ſi alteruter angulorum in baſi,* A, *aut* B *rectus ſit: quadrante minorem ſi uterque vel acutus, vel obtuſus ſit; majorem, ſi alter acutus, reliquus obtuſus ſit: & contra. Si enim alterutter angulorum* A, *vel* B *rectus ſit: alterutrum laterum circuli quadrans eſt per* 9 *hujus; ergo per* 10 *ejuſdem, baſis* A B *etiam circuli quadrans eſt. Sin uterque angulus* A & B *ſimiliter acutus ſit, aut obtuſus: utrumque latus* A C, & C B, *per nonam hujus, quadrante majus, vel minus eſt; ergo per* 10 *ejuſdem; baſis* A B *quadrante minor eſt. Quod ſi alterutter angulorum* A & B *acutus ſit, reliquus obtuſus: per* 9 *hujus, alterutrum laterum quadrante circuli minus, reliquum majus eſt; ergo per* 10 *ejuſdem baſis* A B *quadrante major eſt.*

Converſa ſimiliter probatur. ſit enim baſis A B *circuli quadrans, alterutter angulorum* A *aut* B *rectus eſt: Nam per decimam hujus latus alterutrum quadrans circuli eſt, ergo per* 9 *ejuſdem angulus alter rectus eſt. Si vero* A B *baſis quadrante minor ſit: uterque angulus* A & B *vel acutus, vel obtuſus eſt; nam per* 10 *hujus utrumque latus vel majus eſt vel minus quadrante. Ergo per* 9 *ejuſdem, uterque angulus vel acutus vel obtuſus eſt. Demum ſi* A B *baſis quadrante major ſit, alterutter angulorum* A, *aut* B *acutus eſt, reliquus obtuſus. Nam per* 10 *hujus, latus unum quadrante minus, reliquum majus eſt: ergo per* 9 *ejuſdem, angulus alter acutus, reliquus obtuſus eſt; quæ fuerunt oſtendenda.*

12. Si quadrans maximi circuli, ad quadrantem maximi inclinatus fuerit, & ab inclinato perpendiculares duo deſcendant, quorum alter utriuſque quadrantis terminum ſecet: ſinus recti ſegmentorum quadrantis inclinati, ab inclinationis angulari puncto, perpendicularium rectis ſinibus porportionales ſunt.

Eſto

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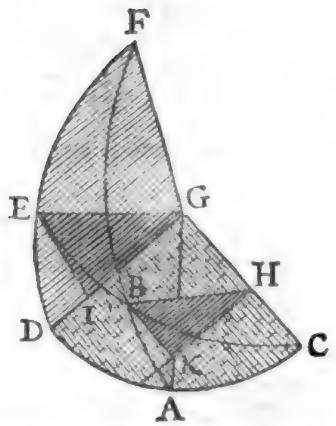

Esto CBE *maximi circuli quadrans, inclinatus ad* CAD *maximi circuli quadrantem; & ab* CBE *inclinato, descendant duo arcus* ED *&* BA: *quorum alter* ED, *secet* E *&* D *terminum utriusque quadrantis* CBE *&* CAD. *Dico rectas* BH *&* EG, *sinus rectos segmentorum* CB, *&* CE, *proportionales esse rectis* BK *&* EI, *rectis sinibus perpendicularium arcuum* BA *&* ED. *Triangula enim* GIE *&* HKB, *sunt æquiangula ob rectos angulos ad* I, *&* K, *per 7 primi hujus; & similem ad* G *&* H, *inclinationis scilicet superficiei quadrantis* GEC, *ad superficiem quadrantis* GDC *ang. Itaque per quartum sexti elementorum, latera quæ subter æquales eos angulos sunt,* BH *&* EG: *Item* BK *&* EI, *sunt proportionalia; quod erat demonstrandum.*

ΠΟΡΙΣΜΑΤΑ *octo.*

Primo itaque, in rectangulo Triangulo, unicum rectum habente, ex data basi, & angulo alterutro obliquo, invenitur latus oppositum. Radius enim est ad sinum basis: ut sinus anguli ad sinum lateris oppositi. Vel, Radius est ad secantem complementi basis; ut secans complementi anguli ad secantem complementi lateris oppositi. Vel sinus basis est ad radium; ut secans complementi anguli, ad secantem complementi lateris oppositi. Vel secans complementi basis est ad radium: ut sinus anguli ad sinum lateris oppositi.

Esto in præcedenti Diagrapha, ABC *Triangulum rectangulum, unicum rectum habens ad* A *per primum porisma quarti hujus: deturque* BC *basis ejus, partium* 60; *& angulus* ACB *part.* 30. *Invenietur* AB *latus oppositum partium* 25 39′ 32″. *Nam per quartam sexti elementorum, &* 19 *septimi,*

Vt E G *radius* 10000000 } *ad* B H *ſinum baſis* B C 8660254 { *Ita* E I *ſinus arcus* E D *vel anguli* A C B *per* 8 *hujus* 5000000, *ad* } B K *ſinum lateris oppoſiti* B A 4330127 *partiũ* 25 39′ 32″.

Ergo latus A B *eſt partium* 25 39′ 32″ *: quadrante minus per* 9 *hujus, quia anguius oppoſitus* A C B *acutus eſt.*

Demonſtratum vero eſt 20 *Theoremate primi hujus, ſinum rectum peripheriæ ad radium eſſe : ut radius ad ſecantem complementi. Itemque, ſecantes peripheriarum, complementorum ſuorum rectis ſinibus proportionales eſſe. Itaque per ſecundum poriſma Theorematis citati,*

Vt radius 10000000 } *ad ſecantem complem. baſis* B C 11547004 { *Ita ſecans compl. anguli dati* 20000000 *ad* } *ſecantem compl. lateris oppoſiti* A B 23094008 *par.* 64 20′ 28″.

Quare latus A B *eſt partium* 25 39 32 *ut ſupra.*

Aliter per primum poriſma Theorematis citati,

Vt ſinus baſis 8660254, *ad* } *Radium* 10000000 { *Ita ſecans complem. ang. dati* 20000000, *ad* } *ſecantem compl. lateris oppoſiti* A B 23094008.

Aliter per ſecundum poriſma ejuſdem,

Vt ſecans cõp. baſis 11547004 *ad* } *Radium* 10000000 { *Ita ſinus anguli dati* 5000000, *ad* } *Sinũ lateris oppoſiti* A B 4330127.

Secundo, data baſi, & latere alterutro, exquiritur angulus oppoſitus. Nam ut ſinus baſis eſt ad radium; ita ſinus lateris dati ad ſinum anguli oppoſiti. Vel, ut ſecans complementi baſis eſt ad radium; ita ſecans complementi lateris, ad ſecantem complementi anguli oppoſiti. Aut, ut radius eſt ad ſinum baſis; ita ſecans complementi lateris, ad ſecantem complementi anguli oppoſiti. Aut, ut radius eſt ad ſecantem complementi baſis : ita ſinus lateris, ad ſinum anguli oppoſiti.

Retro

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Retento ſuperiori Triangulo A B C, *ſit baſis* B C *partium* 60: *& latus* A B *partium* 25 39′ 32. *Invenietur angulus* A C B *oppoſitus, partium* 30. *Nam per quartam ſexti & 19 ſeptimi Euclidis,*

Vt B H *ſinus baſis* B C 8660254 } *ad* E G *radium* 10000000, *ita* { B K *ſinus lateris* A B 4330127, *eſt ad* } E I *ſinum arcus* E D *vel anguli* A C B 5000000. –

Angulus itaque A C B *quæſitus eſt partium* 30: *acutus per 9 hujus, quia latus oppoſitum eſt minus circuli quadrante.*

Aliter per ſecundum poriſma 20 primi hujus,

Vt ſecãs compl. baſis 11547004 *ad* } *Radium* 10000000, *ita* { *Secans compl. lateris dati* 23094008 *ad* } *Secantem compl. ang. oppoſiti* 20000000, *partium* 60.

Itaque ipſe angulus eſt partium 30.

Aliter per primum poriſma ejuſdem,

Vt radius 10000000 } *ad ſinum baſis* 8660254, *ita* { *Secans compl. lateris dati* 23094008, *ad* } *Secantem complem. anguli oppoſiti* 20000000.

Aliter per ſecundum poriſma ejuſdem,

Vt radius 10000000 } *ad ſecantem compl. baſis* 11547004, *ita* { *Sinus lateris dati* 4330127, *ad* } *Sinum anguli oppoſiti* 5000000 *partium* 30.

Tertio, dato latere & angulo huic oppoſito, inveſtigatur baſis, ſi conſtiterit quadrantene major ſit an minor. Nam ut ſinus anguli eſt ad radium; ita ſinus lateris, ad ſinum baſis. Aut, ut ſecans complementi anguli eſt ad radium; ita ſecans complementi lateris, ad ſecantem complementi baſis. Vel, ut radius eſt ad ſinum anguli; ita ſecans complementi lateris eſt, ad ſecantem complementi baſis. Aut, ut radius eſt ad ſecantem complementi anguli: ita ſinus lateris ad ſinum baſis.

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Assumpto & hic superiori Triangulo, detur latus A B *partium* 25 39′ 32″: *& angulus* B C A *oppositus partium* 30; *erit* B C *basis part.* 60. *si fuerit quadrante minor: vel* 120 *si major. Nam per* 4 *sexti, &* 19 *sept. Euclidis,*

Vt E I *sinus angul.* E C D 5000000 *ad* } E G *radium* 10000000 { *Ita* B K *sinus lateris* A B *dati* 4330127 } *ad* B H *sinũ basis* B C 8660254 *minorem quadrante partiũ* 60.

Aut per secundum porisma 20 primi hujus,

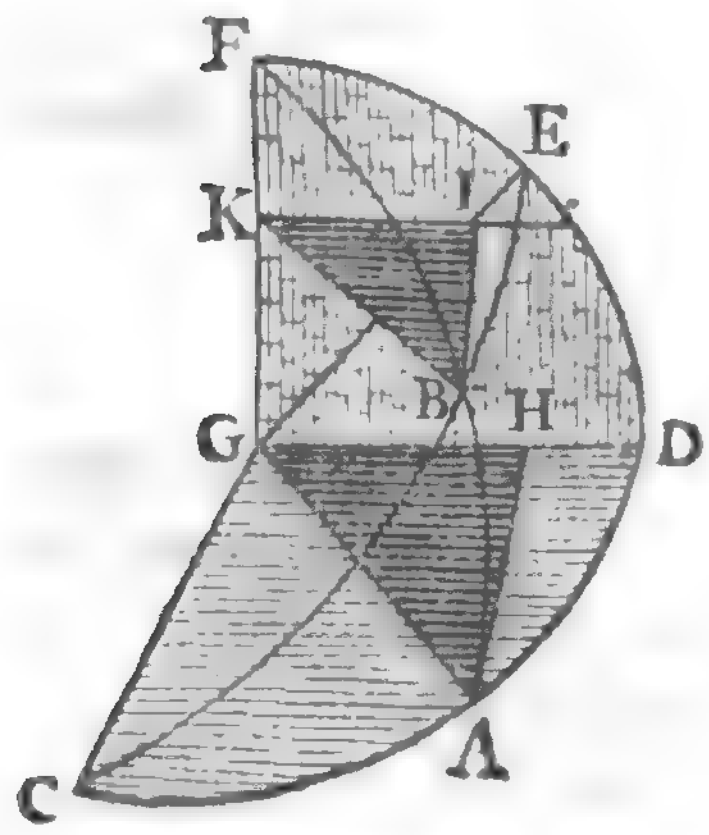
Vt secans compl. ang. 20000000 *ad radium* 10000000 { *Ita secans comp. lateris dati* 23094008, *ad* } *Secantem complemen. basis* 11547004 *part.* 30. *ergo basis est partium* 60.

Vel per primum porisma ejusdem,

Vt radius 10000000 *ad* } *Sinum ang. dati* 5000000 { *Ita secans compl. lateris dati* 23094008, *ad* } *Secantẽ compl. basis* 11547004.

Vel per secundum porisma citatæ,

Vt radius 10000000 *ad* } *Secantẽ compl. ang.* 20000000, *ita* { *Sinus lateris dati* 433012 } *ad sinum basis* 8660254 *ut supra.*



Quarto, dato latere alterutro & basi, innotescit latus reliquum: sinus enim complementi lateris dati est ad radium; ut sinus complementi basis, ad sinum complementi lateris reliqui. Vel, secans lateris dati est ad radium; ut secans basis ad secantem reliqui lateris. Vel, radius est ad sinum complementi lateris; ut secans basis ad secantem lateris alterius. Vel, radius est ad secantem lateris; ut

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ut ſinus complementi baſis, ad ſinum complementi lateris reliqui.

Sit & hic Trianguli A B C, *latus* A B *partium* 25 39′ 32″: *&* B C *baſis partium* 60. *Invenietur reliquum latus* A C, *partium* 56, 18′, 35″. *Nam per quartam ſexti, & 19 ſeptimi Euclidis,*

Vt B K *ſinus arcus* F B, *comple. lateris* A B *dati* 9013880 } *ad* A G *radium* 10000000, *ita* { B I *ſinus arcus* B E, *.i. comp. baſis* B C 5000000, } *ad* A H *ſinũ arcus* A D *comp.lat.* A C 5547002 *partium* 33 41 25.

Itaque A C *latus eſt partium* 56 18′ 35″, *quadrante minus per* 10 *hujus, quia baſis cum reliquo latere ſigillatim quadrante minor eſt.*

Aliter per 2 poriſma viceſimæ primi hujus,

Vt ſecans lateris dati 11094005 } *ad radium* 10000000 { *Ita ſecans baſis* 20000000 } *ad ſecantem reliqui lateris* 18027760 *partiũ* 56 18′ 35″.

Vel per primum poriſma ejuſdem,

Vt radius 10000000 } *ad ſinum comp.lateris dati* 9013880 { *Ita ſecans baſis* 20000000 } *ad ſecantem reliqui lateris* 18027760.

Vel per ſecundum poriſma ejuſdem,

Vt radius 10000000 } *ad ſecantem lateris dati* 11094005 { *Ita ſinus comp. baſis* 5000000 } *ad ſinum comp. lateris quæſiti* 5547002.

Quinto, dato utroque latere inveſtigatur baſis. Nam, ut radius eſt ad ſinum complementi lateris alterutrius: ita ſinus complementi lateris reliqui, eſt ad ſinum complementi baſis. Vel, radius eſt ad ſecantem lateris alterutrius, ut ſecans lateris reliqui ad ſecantem baſis. Vel, ſinus complementi lateris alterutrius eſt ad radium; ut ſecans lateris reliqui, ad ſecantem baſis. Vel, ſecans lateris alterutrius eſt ad radium; ut ſinus complementi lateris reliqui, ad ſinum complementi baſis.

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Detur in Triangulo A B C, *latus* A B *partium* 25 39′ 32″: & A C *reliquum latus partium* 56 18′ 35″. *invenietur basis* B C *partium* 60. *Nam per* 4 *sexti*, & 19 *septimi Euclidis*,

Vt A G *radius*	}	*ad* B K *sinũ arcus*	{	*Ita* A H *sinus arcus*	}	*ad* B I *sinũ arcus*
10000000	}	F B *.i.cõpl.lateris*	{	D A *.i. cõpl.later.*	}	EB *i.cõp.bas.*BC
	}	A B 9013880	{	D C 5547002	}	5000000*par.*30

Ergo basis B C *est partium* 60, *minor circuli quadrante per* 10 *hujus, quia utrumque latus sigillatim quadrante minus est.*

Aliter per secundum porisma 20 *primi hujus*,

Vt radius	}	*ad secantẽ lateris*	{	*Ita secans lateris*	}	*ad secantem basis*
10000000	}	A B 11094005	{	A C 18027760	}	20000000, *part.* 60.

Vel per primum porisma ejusdem,

Vt sinus comp.lat.	}	*ad radium*	{	*Ita secans reliqui*	}	*ad secantem basis*
A B 9013880	}	10000000	{	*lateris* 18027760	}	20000000

Vel per secundum porisma ejusdem,

Vt secans lat.	}	*ad radium*	{	*Ita sinus compl.lateris*	}	*ad sinum cõp.ba-*
A B 11094005	}	10000000	{	*reliqui* 5547002	}	*sis* 5000000.

Sexto, dato latere & angulo adjacente, innotescit obliquus alter. Radius enim est ad sinum complementi lateris: ut sinus anguli, ad sinum complementi reliqui. Aut, radius est ad secantem lateris dati; ut secans complementi anguli, ad secantem anguli reliqui. Aut, sinus complementi lateris dati est ad radium; ut secans complementi anguli, ad secantem reliqui. Aut, secans lateris dati est ad radium; ut sinus anguli, ad sinum complementi reliqui.

Repetita postrema Trianguli nostri figura, detur latus A C *partium* 56 18′ 35″: *angulusque ei adjacens* A C B *partium* 30. *Invenietur reliquus obli-*

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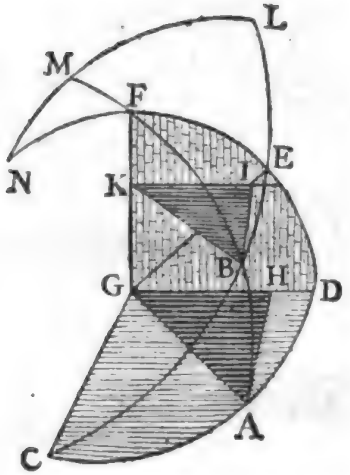

obliquus ABC, *part.* 73 53′ 52″ *& paulo plus. Continuentur enim arcus*, BE *in* L; BF *in* M: *&* EF *in* N; *ut* BL, BM, *&* EN, *quadrantes ſint maximorum circulorum. Facto vero* N *polo, deſcribatur maximi circuli quadrans* NML, *per terminos quadrantum* BM, *&* BL. *Manifeſtum eſt angulum ad* M, *in Triangulo* NMF *rectum eſſe, per primum poriſma quarti hujus: &* baſin FN, *complementum eſſe arcus* FE; *&* proinde *æqualem arcui* ED. *Item angulum ad* F, *æqualem eſſe angulo* AFD, *vel arcui* AD, *complemento ſcilicet lateris* AC. *Quare cum in eodem Triangulo* NMF *rectangulo, detur baſis* FN, *æqualis angulo* ACB: *& angulus ad* F *æqualis complemento lateris* AC; *dabitur etiam oppoſitum angulo latus* NM, *complementum ſcilicet arcus* ML, *anguli ad* B *quæſitum ſubtendentis. Nam per primum poriſma hujus,*

Vt radius 10000000 } *ad baſim* FN *.i.* *ſinũ ang.* ACB 5000000 } *Ita ang.* MFN *.i. ſinus comp. lat.* AC 5547002 } *ad* MN *.i. ſinũ comp. anguli ad* B, 2773501 *partium* 16 6′ 8″ *fere.*

Ergo angul. ABC *eſt partium* 73 53′ 52″; *acutus per* 9 *hujus, quia oppoſitum ei latus* AC *quadrante minus eſt.*

Aliter per 2 *poriſma* 20 *primi hujus,*

Vt radius 10000000 } *ad ſecantem cõpl. ang. dati* 20000000 } *Ita ſecans lateris dati* 18027760 } *ad ſecantem angul. reliqui* 36055520 *part.* 73 53′ 52″, *ut ſupra.*

Vel per primum poriſma ejuſdem,

Vt ſinus anguli dati 5000000 } *ad radium* 10000000 { *Ita ſecans lateris dati* 18027760 } *ad ſecantem anguli reliqui* 36055520.

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Vel per ſecundum poriſma ejuſdem,

Vt ſecans comp. ang. dati 20000000 } *ad radium* 10000000 { *Ita ſinus compl. lateris dati* 5547002 } *ad ſinum compl. anguli reliqui* 2773501.

Septimo, dato latere, & angulo oppoſito; datur obliquus reliquus, ſi ſpecies ejus nota ſit. Sinus enim complementi lateris dati eſt ad radium; ut ſinus complementi anguli dati ad ſinum reliqui. Vel, ſecans lateris dati eſt ad radium; ut ſecans anguli dati, ad ſecantem complementi reliqui. Vel, radius eſt ad ſinum complementi lateris dati: ut ſecans anguli dati, ad ſecantem complementi reliqui. Vel, radius eſt ad ſecantem lateris; ut ſinus complementi anguli dati, ad ſinum reliqui.

Detur in Triangulo A B C *latus* A B *partium* 25 39′ 32″: *& angulus ei oppoſitus* A C B *partium* 30; *cum ſpecie reliqui ad* B *acuta. Invenietur ipſe angulus ad* B *partium* 73 53′ 52″. *Nam in Triangulo* F M N *rectangulo, datur latus* F M, *æquale lateri* A B: *& baſis* N F *æqualis arcui* D E, *.i. angulo* A C B. *Ergo & reliquum latus* N M, *.i. complementum arcus* M L, *vel anguli ad* B, *per quartum poriſma hujus innoteſcit. Nam,*

Vt ſinus cõp. M F *.i.* A B *lat. dati* 9013880 } *ad radium* 10000000 { *Ita ſinus cõpl. baſis* N F *.i. ang. dati* 8660254 } *ad ſinũ* M L *.i. ang. ad* B 9607690 *part.* 73 53 52, *acuti ex theſi.*

Vel per ſecundum poriſma 20 primi hujus,

Vt ſecans A B *lateris dati* 11094005 } *ad radium* 10000000 { *Ita ſecans ang.* A C B *dati* 11547004 } *ad ſecantem complementi angul. reliqui* 10408330 *partium* 16 6′ 8″.

Ergo ipſe angulus eſt partium 73 53′ 52″.

Vel per primum poriſma ejuſdem,

Vt radius 10000000 } *ad ſinũ cõp. lateris dati* 9013880 { *Ita ſecans anguli* A C B 11547004 } *ad ſecantem compl. ang. reliqui* 10408330.

Vel

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Vel per ſecundum poriſma 20 primi hujus,

Vt radius 10000000 } *ad ſecantem lateris* AB 11094005 { *Ita ſinus compl. ang.* ACB *dati* 8660254 } *ad ſinum anguli reliqui* 9607690

Poſtremo, dato utroque angulo obliquo, datur etiam latus alterutrum. Sinus enim anguli unius, ſe habet ad radium; ut ſinus complementi reliqui, ad ſinum complementi lateris oppoſiti. Aut, ſecans complementi anguli unius eſt ad radium; ut ſecans alterius, ad ſecantem lateris oppoſiti. Vel, radius eſt ad ſinum anguli alterutrius; ut ſecans anguli reliqui, ad ſecantem lateris oppoſiti. Vel, radius eſt ad ſecantem complementi anguli unius; ut ſinus complementi alterius, ad ſinum complementi lateris oppoſiti.

Manente poſtremo diagrammate, detur in Triangulo ABC *rectangulo, uterque obliquus angulus ad* B *&* C: *dabitur etiam alterutrum latus. Nam in Triangulo* MFN *rectangulo, datur latus* MN, *complementum arcus* LM, *ſubtendentis angulum ad* B: *& baſis* NF, *complementum ſcilicet arcus* FE, *.i. arcus* ED, *ſubtendens angulum ad* C. *Ergo & angulus ad* F *oppoſitus, .i. arcus* DA, *vel complementum lateris* AC *invenietur. Nam per 2 poriſma hujus,*

Vt ſinus baſis FN *.i. ang. ad* C, 5000000 } *ad radium* 10000000 { *Ita ſinus lateris* MN *.i. cõp. ang. ad* B 2773501 } *ad* MFN *ſinum ang. oppoſiti .i. comple. lateris* AC 5547002 *partiũ* 16 6′ 8″, *fere.*

Ergo ipſum latus AC *eſt partium* 73 53′ 52″ *paulo plus: quadrante minus per 9 hujus, quia angulus oppoſitus acutus eſt.*

Aliter per 2 poriſma 20 primi hujus,

Vt ſecans cõpl. anguli ad C 20000000 } *ad radium* 10000000 { *Ita ſecans ang. reliqui ad* B 36055520, { *ad ſecantem lateris oppoſiti,* 18027760, *par.* 73 53′ 52″, *paulo plus, ut ſupra.*

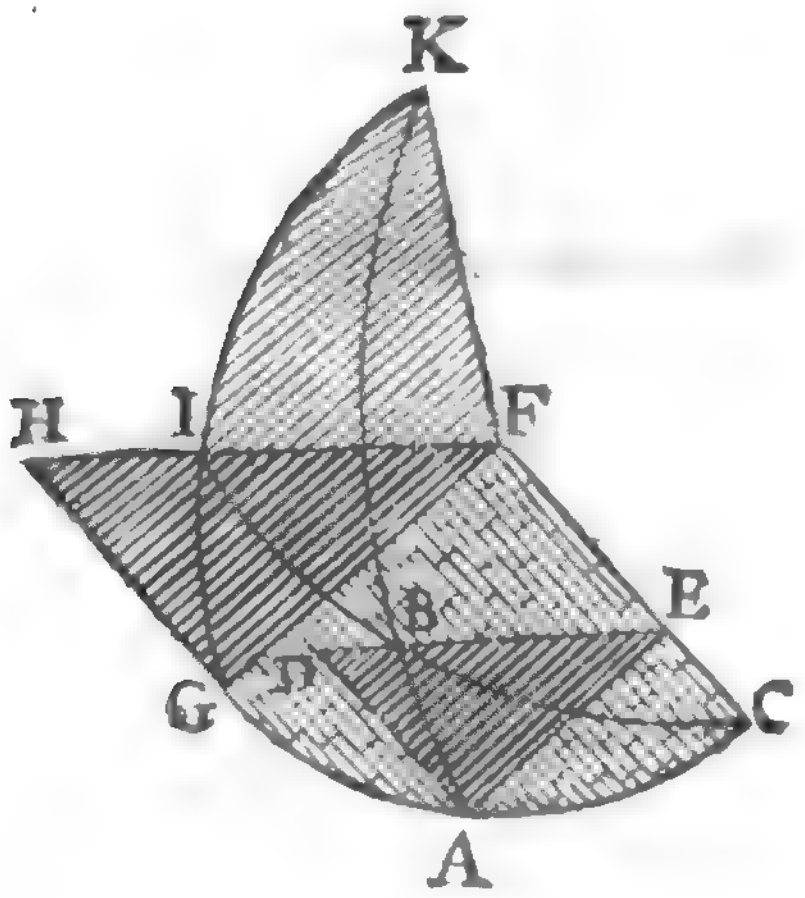
Vel per primum porisma 20 primi hujus,

Vt radius 10000000	*ad sinum ang. ad* C 5000000	*Ita secans ang. ad* B 36055520	*ad secantẽ lateris oppositi*	18027760.

Vel per secundum porisma ejusdem,

Vt radius 10000000	*ad secantem comp. ang. ad* C 20000000	*Ita sinus comp. anguli reliqui* 2773501	*ad sinum compl. lateris oppositi*	5547002.

13. Si quadrans maximi circuli, quadrantem maximi secet, & à secante, duo arcus perpendiculares secto ducantur, quorum alter per utriusque quadrantis terminum transeat; sinus recti segmentorum quadrantis secti, à puncto sectionis, perpendicularium tangentibus proportionales sunt.



Maximi circuli quadrans I B C, *secet* G A C *quadrantem maximi in* C: *& ab* I B C *secante, descendant perpendiculares arcus duo,* I G *&* B A; *quorum alter* I G, *transeat per terminum utriusque quadrantis* I *&* G. *Dico sinus rectos* G F *&* A E, *segmentorum* C I *&* C A: *proportionales esse tangentibus* H G, *&* D A, *perpendicularium* I G *&* B A. *Triangula enim* H G F, *&* D A E, *sunt æquiangula: ob rectos angulos ad* G *&* A, *per* 15 *primi hujus; Communem ad* F *&* E, *inclinationis scilicet angulum superficiei quadrantis secantis, ad superficiem quadrantis secti. Itaque per quartam sexti elementorum sunt latorum proportionalium. Quare ut* G F, *ad* A E: *Ita* H G *ad* D A, *quod erat demonstrandum.*

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ΠΟΡΙΣΜΑΤΑ *octo.*

Primo igitur in rectangulo Triangulo, dato latere & angulo adjacente, inveſtigatur latus reliquum. Radius enim eſt ad ſinum lateris dati; ut tangens anguli adjacentis, ad tangentem reliqui lateris. Vel, radius eſt ad ſecantem complementi lateris: ut tangens complementi anguli adjacentis, ad tangentem complementi lateris alterius. Vel, ſinus lateris dati eſt ad radium: ut tangens complementi anguli adjacentis, ad tangentem complementi lateris reliqui. Vel, ſecans complementi lateris dati, eſt ad radium: ut tangens anguli adjacentis, ad tangentem reliqui lateris.

Aſſumpto & hic Triangulo A B C *rectangulo, detur latus* A C *partium* 56 18′ 35″: *& angulus adjacens ad* C *partium* 30. *invenietur reliquum latus* A B, *part.* 25 39′ 32″. *Nam per* 4 *ſexti &* 19 *ſepti. Euclidis,*

Vt G F *radius* 10000000 } *ad* A E *ſinũ lateris* A C 8320482 { *Ita* G H *tangens arcus* I G *.i. ang. ad* C; 5773502 } *ad* A D *tangentem later.* A B 4803831 *par.* 25 39′ 32″. *quadrã. minoris per* 9 *hujus quia ang. oppoſ. acutus eſt.*

Demonſtratum vero eſt 20 *Theoremate primi hujus, ſecantes arcuum, complementorum ſuorum rectis ſinibus: itemque* 17 *ejuſdem, tangentes arcuum complementorum ſuorum tangentibus proportionales eſſe. Itaque ſi loco ſinuũ, tangentiumque peripheriarum datarum, aſſumantur complementorum ſecantes & tangentes, manebit eadem proportio. Quare,*

Vt radius 10000000 } *ad ſecantẽ cõp. lateris dati* 12018535 { *Ita tangens comp. anguli ad* C 17320508 } *ad tang. comp. lateris oppoſiti* A B 20816713 *partium* 64 20′ 28″.

Ergo ipſum latus eſt partium 25 39′ 32″.

Vel, quia radius media proportione eſt ad tangentes peripheriæ & complementi, per 17 *primi hujus,*

Sinus lateris A C 8320482 } *eſt ad radium* 10000000 { *ut tangens cõp. anguli dati* 17320508 } *ad tangent. complementi lateris* A B *oppoſiti* 20816713.

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Vel,

Secans cõp. lateris AC 12018535 } *eſt ad radium* 10000000 { *ut tangens anguli* C 5773502 } *ad tangent. lateris* AB *oppoſiti* 4803831.

Secundo, dato latere & angulo oppoſito, exquiritur reliquum latus, ſi conſtiterit quadrantene majus ſit an minus. Nam ut tangens anguli dati eſt ad radium: ita tangens lateris oppoſiti, ad ſinum anguli reliqui. Vel, ut tangens complementi anguli noti, ad radium eſt: ita tangens complementi lateris oppoſiti, ad ſecantem complementi lateris alterius. Vel, ut radius ad tangentem anguli dati; ita tangens complementi alterius lateris, ad ſecantem complementi lateris oppoſiti. Vel, ut radius ad tangentem complementi anguli dati: ita tangens lateris oppoſiti, ad ſinum lateris reliqui.

Manente figura ſuperioris Trianguli ſit latus AB *part.* 25 39′ 32″: *& angulus ad* C *oppoſitus partium* 30; *dabitur reliquum latus* AC *partium* 56 18′ 35″. *Nam per* 4 *ſexti &* 19 *ſeptimi Euclidis,*

Vt GH *tangen. arcus* IG *i. ang. ad* C 5773502 } *ad* GF *radiũ* 10000000 { *Ita* AD *tãg. lateris* AB *oppoſiti* 4803831 } *ad* AE *ſinũ lateris reliqui* AC 8320482. *part.* 56 18′ 35″ *ſi minus quadrante ſit, partium vero* 123 41′ 25″ *ſi majus ſit.*

Vel per 17 & 20 primi hujus,

Vt tangens cõp. anguli ad C 17320508 } *ad radium* 10000000 { *Ita tangens compl. later. oppoſiti* AB 20816713 { *ad ſecantem compl. later.* AC 12018535. *part.* 33 41 25.

Ergo ſi ipſum latus quadrante minus eſt, partium eſt 56 18′ 35″.

Vel per 17 primi hujus,

Vt radius 10000000 } *ad tangent. ang.* C 5773502 { *Ita tang. comp. late. oppoſiti* AB 20816713 } *ad ſecan. cõp. lateris* AC 12018535.

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Vel,

Vt radius 10000000 } *ad tangentem comp. anguli ad* C 17320508 { *Ita tangens later. oppositi* A B 4803831 } *ad sinum lateris reliqui* A C 8320482.

Tertio, dato utroque latere, datur angulorum obliquorum alteruter, sinus enim lateris alterutrius est ad radium; ut tangens reliqui lateris, ad tangentem anguli oppositi. Aut, secans complementi lateris alterutrius ad radium est: ut tangens complementi alterius lateris, ad tangentem complementi anguli oppositi. Aut, radius est ad sinum lateris alterutrius: ut tangens complementi reliqui lateris, ad tangentem complementi anguli oppositi. Vel, radius est ad secantem complementi lateris unius: ut tangens alterius, ad tangentem anguli oppositi.

Retento superiori Triangulo A B C, *detur latus* A B *part.* 25 39′ 32″: A C *partium* 56 18′ 35″. *invenietur angulus ad* C *partium* 30. *Nam per* 4 *sexti &* 19 *septimi Euclidis,*

Vt A E *sinus lateris* A C 8320482 } *ad* G F *radiũ* 10000000 { *Ita* A D *tangens reliqui lateris* A B 4803831 } *ad* G H *tangẽte arcus* I G. *i. ang. ad* C *oppositi* 5773502. *partium* 30: *acuti per* 9 *hujus, quia latus oppositum est quadrante minus.*

Aliter per 17 & 20 primi hujus,

Vt secans cõp. lat. A C 12018535 } *ad radium* 10000000 { *Ita tangens cõp. reliqui lateris* A B 20816713 } *ad tangentem compl. anguli ad* C *oppositi* 17320508 *part.* 60.

Ergo ipse angulus est partium 30, *ut supra.*

Vel per 17 primi hujus,

Vt radius 10000000 } *ad sinum lateris* A C 8320482 { *Ita tangens compl. reliqui lateris* A B 20816713 } *ad tangentem comp. ang. ad* C *oppositi* 17320508.

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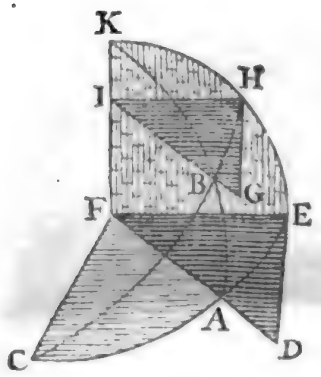
Vel per idem Theorema,

Vt radius 10000000 } *ad ſecantem cõp. lateris* A C 12018535 { *Ita tang. reliqui lat.* A B 4803831 } *ad tangentem ang. ad* C *oppoſiti* 5773502.



Quarto, data baſi & angulo, inveſtigatur latus adjacens. Nam ut ſinus complementi anguli dati ad radium: ita tangens complementi baſis eſt, ad tangentem complementi lateris dato angulo adjacentis. Vel, ut ſecans anguli dati eſt ad radium: ita tangens baſis, ad tangentem lateris dato angulo adjacentis. Aut, radius eſt ad ſinum complementi anguli dati; ut tangens baſis ad tangentem lateris angulo dato adjacentis. Aut, radius eſt ad ſecantem anguli dati: ut tangens complementi baſis, ad tangentem complementi lateris dato angulo adjacentis.

Aſſumpto & hic Triangulo A B C *rectangulo, detur baſis* B C *part.* 60: *& angulus ad* C *partium* 30. *invenietur latus* A C *part.* 56 18′ 35″. *Nam per quartam ſexti & 19 ſeptimi Euclidis,*

Vt IH *ſinus arcus* KH *compl.* HE *i. ang. ad* C 8660254 } *ad* F E *radiũ* 10000000 { *Ita* H G *tangens arcus* HB *i. cõplementi baſis* B C 5773502 } *ad* E D *tangentem arcus* E A *i. comp. lateris* A C 6666665. *partiũ* 33 41′ 25″.

Ergo ipſum latus A C *eſt partium* 56 18′ 35″. *quadrante minus per 9 & 10 hujus. Nam propter angulum ad* C *acutum, latus* A B *quadrante minus eſt: propter baſin verò etiam quadrante minorem, reliquum latus* A C *quadrante minus eſt.*

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Vel per 17 & 20 primi hujus,

Vt ſecans anguli ad C 11547004 } *ad radium* 10000000 { *Ita tangens baſis* 17320508 } *ad tangentem lateris* AC *angulo dato adjacentis* 15000000 *partium* 56 18′ 35″.

Vel per 17 primi hujus,

Vt radius 10000000 } *ad ſinũ cõp. ang. ad* C 8660254 { *Ita tangens baſis* 17320508 } *ad tangen. lateris* AC *ang. dato adjacentis* 15000000 *partium* 56 18′ 35″.

Vel,

Vt radius 10000000 } *ad ſecantem anguli ad* C 11547004 { *Ita tangens comp. baſis* 5773502 { *ad tangentem complementi lateris* AC 6666665. *ut ſupra.*

Quinto, dato latere & angulo adjacente, invenitur baſis. Radius enim eſt ad ſinum complementi anguli: ut tangens complementi lateris ad tangentem complementi baſis. Aut, radius eſt ad ſecantem anguli; ut tangens lateris ad tangentem baſis. Vel, ſinus complementi anguli eſt ad radium, ut tangens lateris ad tangentem baſis. Vel, ſecans anguli eſt ad radium; ut tangens complementi lateris ad tangentem complementi baſis.

Maneat & hic poſtremum noſtrum diagramma, deturque in Triangulo ABC, *latus* AC *partium* 56 18′ 35″: *angulusque ad* C, *part.* 30. *invenietur baſis* BC *partium* 60. *Nam per quartam ſexti & decimamnonam ſeptimi Euclidis,*

Vt FE *radius* 10000000 } *ad* IH *ſinum arcus* KH *.i. comp.* HE, *vel ang. ad* C, 8660254 { *Ita tangens* ED *.i. comp. lateris* AC, 6666665 { *ad* HG, *tangentem* HB, *comp. baſis*, 5773502. *partium* 30.

Ergo baſis eſt partium 60, *quadrante minor per* 10 *hujus, quia uterque latus*

latus ſingulatim quadrante minus eſt: A C *quidem ex theſi,* A B *vero propter angulum ad* C *acutum.*

Vel per 17 & 20 Theorema primi hujus,

Vt radius	*ad ſecantem ang.*	*Ita tangens Lateris*	*ad tangentem baſis*
10000000	*ad* C 11547004	A C 15000000	17320508, *pa.* 60.

Vel per 17 primi hujus,

Vt ſinus cõp. ang.	*ad radium*	*Ita tangens Lateris*	*ad tangentem baſis*
ad C 8660254	10000000	A C 15000000	17320508, *pa.* 60.

Vel per idem Theorema,

Vt ſecans ang. ad C 11547004	*ad radium* 10000000	*Ita tangens complementi Lateris* A C 6666665	*ad tangentem comp. baſis* 5773502, *ut ſupra.*

Sexto, data baſi & latere, manifeſtatur angulus adjacens. Tangens enim complementi lateris dati eſt ad radium; ut tangens complementi baſis ad ſinum complementi anguli adjacentis. Vel, tangens lateris dati eſt ad radium; ut tangens baſis ad ſecantem anguli adjacentis. Vel, radius eſt ad tangentem complementi lateris dati; ut tangens baſis ad ſecantem anguguli adjacentis. Vel, radius eſt ad tangentem lateris dati; ut tangens complementi baſis, ad ſinum complementi anguli adjacentis.

Repetita & hic ſuperioris Trianguli noſtri figura, detur B C *baſis partium* 60: *Latuſque* A C *partium* 56 18 35. *invenietur angulus ad* C *adjacens partium* 30. *Nam per* 4 *ſexti &* 19 *ſeptimi Euclidis,*

Vt E D *tangens arcus* E A *.i. cõp. lateris* A C 6666665.	*ad* F E *radium* 10000000	*Ita* G H *tangens arcus* H B *.i. complem. baſis* B C 5773502	*ad* I H *ſinũ arcus* K H *.i. cõp.* H E *vel anguli ad* C 8660254. *par.* 60.

Ergo ipſe angulus ad C *eſt partium* 30, *acutus: baſis enim* C B *eſt minor quadrante. Itaque per* 10 *hujus, utrumque latus* A D & B D *eſt qua-*

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quadrante circuli minus vel majus. Sed A D *unum latus eſt quadrante minus ex theſi. itaque & reliquum* B D: *proinde oppoſitus angulus ad* A *per 9 hujus acutus eſt.*

Aliter per 17 & 20 primi hujus,

Vt tangens lateris A C 15000000 } *ad radium* 10000000 { *Ita tangens baſis* 17320508 } *ad ſecantem anguli ad* C *adjacentis* 11547002 *partium* 30.

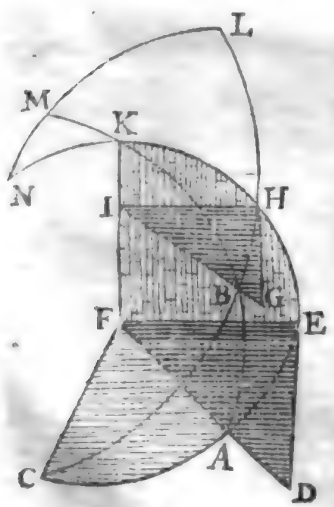
Vel per 17 primi hujus,

Vt radius 10000000 } *ad tangentẽ cõp. lateris* A C 6666665 { *Ita tangens baſis* 17320508 } *ad ſecantem ang. ad* C 11547002, *part.* 30.

Vel,

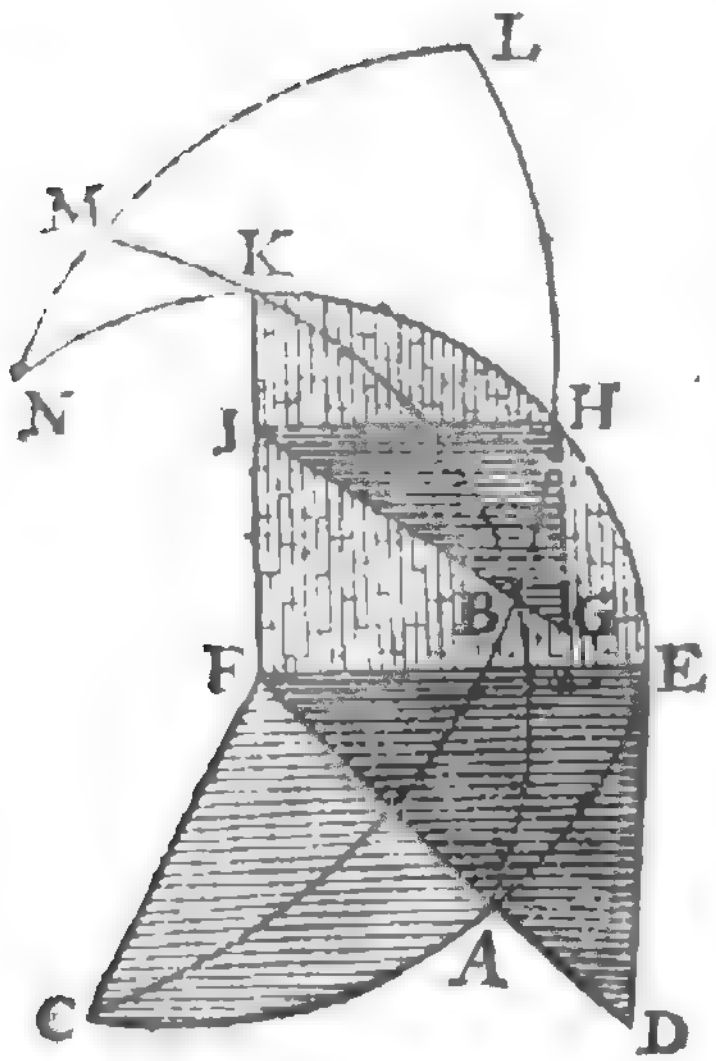
Vt radius 10000000 } *ad tangentem lateris* A C 15000000 { *Ita tangens comp. baſis* 5773502 } *ad ſinum compl. ang. ad* C 8660254.

Septimo, data baſi & angulo obliquo alterutro, invenitur reliquus. Nam ut ſinus complementi baſis eſt ad radium: ita tangens complementi anguli, ad tangentem anguli reliqui. Aut, ut ſecans baſis eſt ad radium; ita tangens anguli, ad tangentem complementi reliqui. Vel, ut radius eſt ad ſinum complementi baſis; ita tangens anguli, ad tangentem complementi reliqui. Vel, ut radius eſt ad ſecantem baſis; ita tangens complementi anguli, ad tangentem reliqui.



Detur in Triangulo A B C, *baſis* B C *partium* 60: *& angulus ad* C *partium* 30: *dabitur reliquus ad* B *par-*

T *tium*



tium 73 53' 52". Repetitur enim figura, quæ fuit ſexto poriſmate Theorematis præmiſſi. Demonſtratum fuit, illic, arcum HL *æqualem eſſe baſi* BC, *& menſuram eſſe anguli ad* N, *in Triangulo* NMK *rectangulo ad* M: *Item* EH *menſuram anguli ad* C *in Triangulo* ABC, *æqualem eſſe baſi* NK *in Triangulo* NMK; ML *vero arcum, menſuram eſſe anguli ad* B *quæſiti, &* MN *complementum ejuſdem. Quare cum in Triangulo* NMK, *detur angulus ad* N, *cum baſi* NK: *dabitur etiam per quartum hujus* NM, *latus angulo adjacens, i. complementum anguli ad* B *quæſiti. Nam,*

Vt ſinus comp. ang. ad N. *i. baſis datæ* 5000000 } *ad radium* 10000000 { *Ita tangens comp. baſis* NK *i. ang. ad* C 17320508 } *ad tangentẽ comp.* MN *i. ad tangentem arcus* ML *vel ang. ad* B 34641016 *part.* 73 53' 52" *acut.*

Nam quia baſis quadrante minor eſt, latera ſunt quadrante majora, vel minora ſimiliter per 10 *hujus. Sed* AB *latus quadrante minus eſt per* 9 *hujus, propter angulum ad* C *oppoſitum acutum: Ergo & reliquum latus quadrante minus eſt, & reliquus angulus acutus. Aliter per* 17 *vel* 20 *primi hujus,*

Vt ſecans baſis 20000000 } *ad radium* 10000000 { *Ita tang. anguli ad* C 5773502 } *ad tangentem complementi anguli reliqui* 2886751 *partium* 16 6' 8".

Vel per 17 *primi hujus,*

Vt radius 10000000 } *ad ſinum compl. baſis* 5000000 { *Ita tang. ang. ad* C 5773502 } *ad tang. comp. anguli reliqui* 2886751.

Vel per idem Theorema,

Vt radius 10000000 } *ad ſecantem baſis* 20000000 { *Ita tang. comp. ang. ad* C 17320508 } *ad tangent. ang. reliqui* 34641016.

Poſtremo,

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Poſtremo, dato utroque angulo obliquo datur baſis. Tangens enim anguli alterutrius eſt ad radium; ut tangens complementi anguli reliqui, ad ſinum complementi baſis. Vel, tangens complementi anguli alterutrius eſt ad radium; ut tangens anguli reliqui ad ſecantem baſis. Aut, radius eſt ad tangentem anguli alterutrius; ut tangens anguli reliqui ad ſecantem baſis. Aut, radius eſt ad tangentem complementi anguli alterutrius; ut tangens complementi anguli reliqui ad ſinum complementi baſis.

Manente ſuperiori diagrapha, detur angulus ad C *part.* 30: *& reliquus ad* B *partium* 73 53′ 52″. *Dabitur baſis* BC *partium* 60. *Aſſumatur enim & hic Triangulum* NMK *rectangulum: in quo cum detur latus* NM, *complementum ſcilicet arcus* ML .*i. anguli ad* B; *& baſis* NK, *æqualis arcui* HE, .*i. angulo reliquo ad* C, *datur etiam angulus ad* N, *vel arcus* LH .*i. baſis* BC. *Nam per* 6 *poriſma hujus*,

Vt tangens compl. NM .*i. arcus* ML *vel angul. ad* B, 34641016	*ad radium*	10000000	*Ita tangens comple. baſis* NK, .*i. arcus* HE *vel ang. ad* C	17320508	*ad ſinũ comp. ang. ad* N .*i. arcus* LH *vel baſis* BC	5000000 *partium* 30.

Ergo baſis eſt partium 60, *quadrante minor per* 11 *hujus, quia angulus uterque acutus eſt.*

Aliter per 17 & 20 Theorema primi hujus,

Vt tangẽs cõp. ang. ad B 2886751	*ad radium*	10000000	*Ita tang. ang. ad* C 5773502		*ad ſecantem baſis*	20000000 *partium* 60.

Vel per 17 primi hujus,

Vt radius 10000000	*ad tang. ang. ad* B 34641016		*Ita tangens anguli ad* C 5773502		*ad ſecantem baſis* 20000000	

Vel per idem Theorema,

Vt radius 10000000	*ad tang. comp. ang. ad* B 2886751		*Ita tang. comp. ang. ad* C 17320508		*ad ſinum compl. baſis* 5000000	

Atque ita calculus rectangulorum Triangulorum expoſitus eſt. Sequitur

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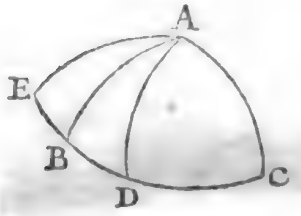
Obliquangulorum Sphæricorum Calculus.

14. Triangulum obliquangulum Sphæricum eſt, cujus tres anguli obliqui ſunt.

15. Si triangulum obliquangulum, acutos duos angulos aut obtuſos habuerit, perpendicularis arcus, ab angulari puncto tertii egrediens, cadit intra triangulum: ſin angulorum alter acutus, & reliquus obtuſus extiterit, cadit extra.



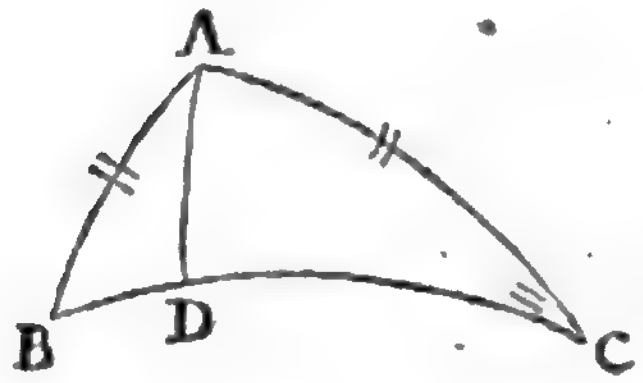
Eſto obliquangulum Triangulum A B C, *acutangulum ad* B *&* C: *dico perpendicularem* A D, *demiſſum ab* A *vertice anguli tertii, cadere intra Triangulum. Nam ſi non cadit intra: vel lateri alterutri coincidat, vel extra cadat neceſſe eſt. Si lateri alterutri coincidat: tunc angulus ad* C, *vel* B *rectus eſt, quod eſt contra theſin. Si extra cadit exempli gratia in* E: *angulus ad* E *rectus eſt. Sed angulus* A B E *obtuſus eſt, reliquus ſcilicet acuti* A B C. *Itaque per 9 hujus, latus* A E *eſt majus circuli quadrante. Rurſus quia angulus ad* C *acutus eſt in Triangulo* A E C *rectangulo, per citatum theorema, latus* A E *quadrante minus eſt. Itaque* A E *latus, commune utrique Triangulo* A E B, *&* A E C, *eſt quadrante majus & minus; quod abſurdum eſt. Conſequitur igitur perpendicularem cadere intra Triangulum datum.*

Eſto verò A E B *triangulum, obtuſangulum ad* B: *acutangulum ad* E. *Dico* A D *perpendicularem cadere extra Triangulum, in latus* E B *continuatum. Secus ſi non: vel lateri alterutri coincidit, vel intra cadit. Sed coincidere nequit, quia tunc alteruter angulorum ad* B, *vel* E *rectus eſſet: Intra cadere nequit, quia uterque angulorum ad* B, *&* E, *acutus eſſet, vel obtuſus, ex prima parte hujus. Vtrumque eſt contra theſin. Conſequitur igitur, perpendicularem extra Triangulum cadere, ſi alter angulorum acutus, & reliquus obtuſus extiterit: quæ fuerunt demonſtranda.*

ΠΟΡΙΣΜΑΤΑ *quatuor.*

Primò itaque in Triangulo obliquangulo datis duobus lateribus

ribus & angulo uni eorum oppoſito, inſuper nota ſpecie anguli alteri dato lateri oppoſiti, anguli reliqui latuſque tertium inveniuntur. Demiſſus enim ab angulo datis lateribus contento, in oppoſitum latus (continuatum ſi oportet) perpendicularis arcus, obliquangulum Triangulum in duo rectangula ſecat, ex quorum calculo quæſita inveniuntur.



Eſto Sphæricum Triangulum A B C *obliquangulum: in quo dentur latera*, A C *part.* 50, A B *part.* 26 22′ 20″, *& angulus ad* C *part.* 30, *cum ſpecie anguli ad* B *acuta; dabuntur anguli ad* A *&* B, *cum tertio latere* B C. *Deſcendat enim perpendicularis* A D *in latus* B C, *qui intra Triangulum cadit, propter utrumque angulum ad* B *&* C *acutum; fiuntque rectangula Triangula duo*, A D C *&* A D B, *datuſque in Triangulo* A D C *baſis* A C *part.* 50, *& angulus ad* C *part.* 30. *Itaque per primum poriſma duodecimi hujus*, A D *eſt part.* 22 31′ 15″: *quadrante circuli minus, per* 9 *hujus, quia oppoſitus angulus acutus eſt.*

Iam ſi quæratur angulus ad B, *dabitur adminiculo perpendicularis* A D *inventi. Nam in Triangulo* A D B *rectangulo, datur baſis* A B *part.* 26 22′ 20″, *& latus* A D *part.* 22 31′ 15″. *Itaque per* 2 *poriſma* 12 *hujus, angulus ad* B *eſt part.* 59 34′ 21″ *acutus per* 9 *hujus, quia oppoſitum latus quadrante minus eſt.*

Eodem modo definitur angulus ad A. *Nam in Triangulo* A D B *datur baſis* A B *part.* 26 22′ 20″, *& latus* A D *part.* 22 31′ 15″. *Itaque per* 6 *poriſma* 13 *hujus, angulus* B A D *eſt part.* 33 14′ 53″, *acutus. Nam quia baſis* A B *eſt minor quadrante, utrumque latus* A D *&* B D, *quadrante minus eſt, aut majus. Sed* A D *latus minus eſt quadrante, itaque &* B D. *Quare per* 9 *hujus, angulus ad* A *oppoſitus acutus eſt. Rurſus in Triangulo rectangulo* A D C, *datur baſis* A C *part.* 50, *& angulus ad* C *part.* 30, *& latus* A D *part.* 22 31′ 15″; *Itaque per* 7 *poriſma* 12, *vel per* 6, *aut* 7 *decimitertii (plura enim hic data ſunt) angulus* D A C *eſt part.* 69 38′ 20″, *acutus, quia baſis & latus quadrante minor eſt. Anguli verò* B A D, *&* C A D *æquales ſunt angulo* B A C, *ergo angulus* B A C *eſt part.* 102 53′ 13″.

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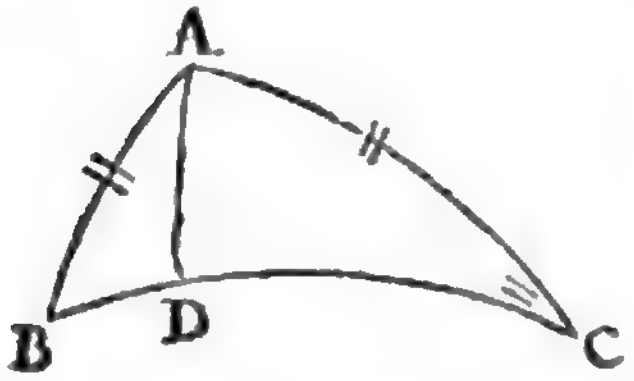
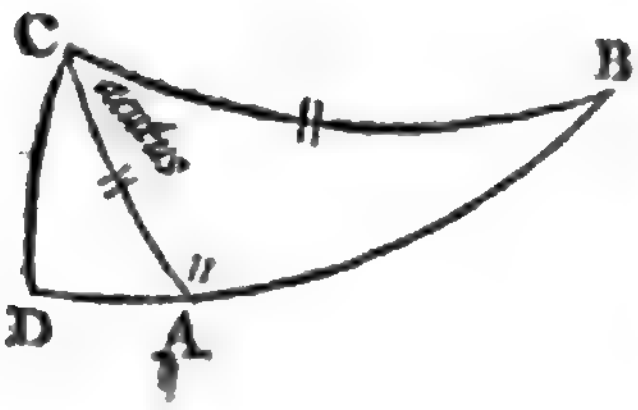


Quin & latus B C *eadem methodo inveſtigatur. In Triangulo enim rectangulo* B A D *datur baſis* A B *part.* 26 22′ 20″, *& latus* A D *part.* 22 31′ 15″. *Quare per* 4 *poriſma duodecimi hujus,* B D *eſt part.* 14 5′ 44″, *quadrante minor per* 10 *hujus, quia baſis cum dato latere ſigillatim quadrante minores ſunt. Præterea in Triangulo rectangulo* A D C *datur baſis* A C *part.* 50; *angulus ad* C *partium* 30, *cum latere* A D *part.* 22 31′ 15″. *Quare per* 4 *poriſma* 12 *hujus, vel per* 2 *aut* 4 *decimitertii, latus* D C *eſt part.* 45 54′ 16″, *quadrante minus, quia baſis & latus datum quadrante minus eſt. Iam cum* B D *ſit part.* 14 5′ 44″; *&* D C *part.* 45 54′ 16″, *latus* B D C, *utriuſque ſumma eſt part.* 60.



Et ſic quidem propoſiti Trianguli poſtulata innoteſcunt, perpendiculari intra Triangulum cadente: Diverſa autem parum eſt ratio, perpendiculari cadente extra. Eſto enim obliquangulum Triangulum A B C, *in quo detur* A C *latus part.* 26 22′ 20″, B C *partium* 60, *& angulus ad* B *part.* 102 53′ 13″, *cum ſpecie anguli ad* C *acuta: Invenientur reliqui anguli ad* C *&* B, *cum latere tertio* A B. *Emiſſo enim perpendiculari arcu* C D, *ex angulari puncto datorum laterum* C, *cadente extra, propter angulos ad* A *&* C *ſpecie diverſos, fiunt ut ſupra duo Triangula rectangula* A D C *&* B D C, *ex quorum calculo quæſita invenientur. In Triangulo enim* A D C *datur baſis* A C *part.* 26 22′ 20″, *cum angulo ad* A *part.* 77 6′ 47″, *reliquo ſcilicet ipſius* B A C *ad ſemicirculum; itaque* C D *perpendicularis per primum poriſma* 12 *hujus eſt part.* 25 39′ 32″.

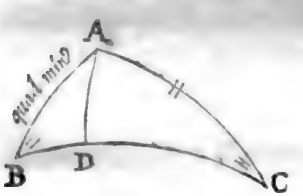
Secundo, in Triangulo B D C *rectangulo datur baſis* B C *part.* 60, *& latus* C D *part.* 25 39′ 32″; *Itaque per ſecundum poriſma* 12 *hujus, angulus ad* B *eſt part.* 30.

Tertio, in eodem Triangulo rectangulo B D C, *datur baſis* B C *part.* 60, *cum latere* C D *part.* 25 39′ 32″, *ergo per* 6 *poriſma* 13 *hujus, angulus* B C D *eſt part.* 73 53′ 52″. *Item in Triangulo rectangulo* A D C, *datur baſis* A C *part.* 26 22′ 20″, *cum latere* C D *part.* 25 39′ 32″; *ergo*

ergo per idem porisma angulus A C D *est part.* 14 19′ 31″. *Ablato vero angulo* A C D *ex angulo* B C D, *relinquitur angulus* A C B *partium* 59 34′ 21″.

Postremo, in Triangulo rectangulo B D C, *datur basis* B C *part.* 60, *cum angulo ad* C *part.* 73 53′ 52″, *ergo per primum porisma* 12 *hujus, latus angulo dato oppositum* B D *est part.* 56 18′ 35″. *Item in Triangulo rectangulo* A D C *datur basis* A C *part.* 26 22′ 20″, *cum angulo ad* C *part.* 14 19′ 31″, *ergo per idem porisma, latus* A D *angulo* C *oppositum est part.* 6 18′ 35″. *Aufer autem* A D *ex* B D, *& relinquitur latus* A B *part.* 50. *Quæ fuerunt investiganda.*

Secundo, datis duobus angulis, & latere uni eorum oppositio, patescunt reliqua latera, & angulus tertius, si modo constiterit utrum latus ignotum dato angulo oppositum, quadrante majus fuerit an minus. Perpendicularis enim arcus eductus à termino lateris dati, in latus utrique angulo dato adjacens, (continuatum si oportet) obliquangulum in duo Triangula rectangula dividit, unde postulata innotescunt.

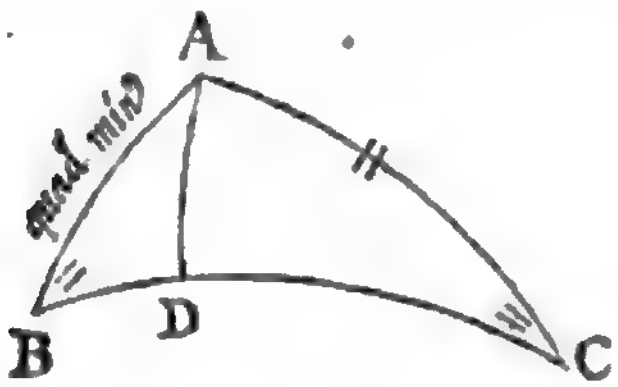


Detur A B C *triangulum non rectangulum, & in eo latus* A C *part.* 50, *cum angulis, ad* C *quidem part.* 30, *sed ad* B *part.* 59 34′ 21″: *sitque* A B *latus ignotum quadrante minus. Innotescent hinc reliqua latera* A B *&* D C, *cum angulo tertio ad* A.

Primum enim in Triangulo rectangulo A D C *datur basis* A C *part.* 50, *cum ang. ad* C *partium* 30. *Ergo per primum porisma* 12 *hujus perpendicularis* A D *est part.* 22 31′ 15″: *caditque intra Triangulum, quia* B *&* C *anguli dati sunt acuti.*

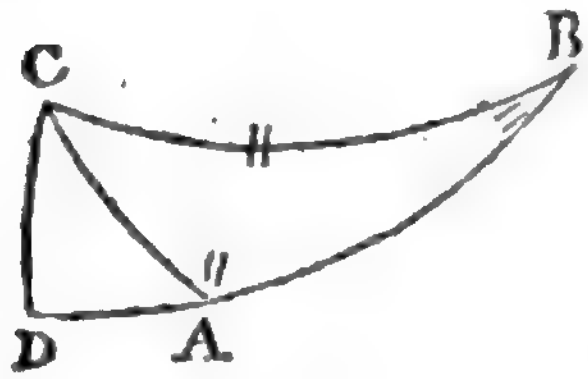
Secundo, in Triangulo rectangulo A D B *datur latus* A D *part.* 22 31′ 15″, *cum opposito angulo* B *part.* 59 34′ 21″; *itaque basis* A B, *per* 3 *porisma* 12 *hujus, est part.* 26 22′ 20″, *quadrante minor ex thesi.*

Tertio, in Triangulo A D B *rectangulo, ex latere* A D *part.* 22 31′ 15″, *& angulo* B *part.* 59 34′ 21″, *datur latus* B D *per idem porisma partium* 14 5′ 44″, *quadrante minus, propter* A B *basin quadrante minorem. Item in Triangulo* A D C *rectangulo, ex latere* A D *part.* 22 31′ 15″, *& ang.*



& ang. C *part.* 30 *(vel ex aliis, quia plura data sunt) datur latus* D C *part.* 45 54′ 16″. *Summa vero laterum* B D *&* D C, *part.* 60, *æquatur lateri* B C.

Postremo, in Triangulo rectangulo A D C, *propter datam basim* A C, *cum latere* D C, *& angulo* C, *invenitur angulus* D A C *partium* 69 38′ 20″. *Item in Triangulo rectangulo* A D B, *ex data basi* A B, *& latere* B D, *cum angulo* B, *patescit multis modis ang.* B A D *part.* 33 14′ 53″. *Summa vero angulorum* D A C *&* B A D, *æqualis est angulo* B A C *tertio, part.* 102 53′ 13″.



Et sic postulata porismatis nostri investigata sunt, perpendiculari arcu cadente intra Triangulum. Similis fere est ratio si cadat extra. Detur enim in appositio Triangulo A B C *obliquangulo, angulus ad* A *part.* 102 53′ 13″, *ad* B *part.* 30, *cum latere* B C *part.* 60; *innotescent hinc reliqua latera & angulus tertius.*

Primum enim, quia perpendicularis C D *cadit extra, dantur in Triangulo rectangulo* B D C, *basis* B C *partium* 60, *cum angulo* C *part.* 30. *Quare per primum porisma* 12 *hujus, perpendicularis* C D *est partium* 25 39′ 32″.

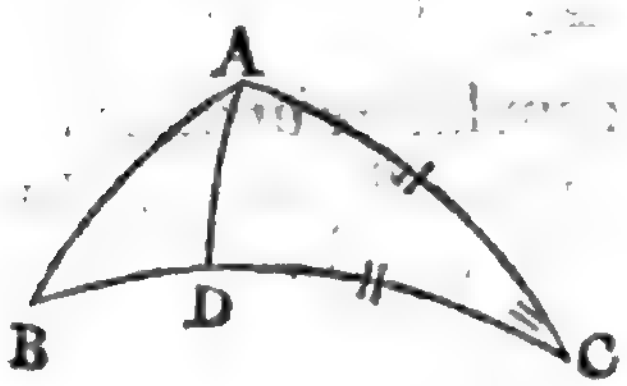
Secundo, in Triangulo rectangulo A C D, *datur perpendicularis* C D *part.* 25 39′ 32″, *cum angulo ad* A, *residuo scilicet ipsius* B A C *ad semicirculum part.* 77 6′ 47″; *Ergo per secundum porisma* 13 *hujus, angulus* A C D *est part.* 14 19′ 31″. *Item in Triangulo rectangulo* B C D, *datur perpendicularis* C D *part.* 25 39′ 32″, *& angulus ad* B *part.* 30. *Ergo per idem porisma, vel per alia quia plura data sunt, angulus* B C D *est part.* 73 53′ 52″. *Aufer autem angulum* A C D *ex angulo* B C D, *& reliquus erit angulus tertius* A C B *part.* 59 34′ 21″.

Tertio, in Triangulo rectangulo A D C, *ex dato utroque angulo* C *&* A *cum latere* C D, *datur reliquum latus* D A *part.* 6 18′ 35″. *Item in Triangulo rectangulo* B D C, *ex dato utroque angulo* B *&* C, *etiam latere* C D, *& basi* B C, *multis modis manifestatur latus* B D *part.* 56 18′ 35″. *Tolle autem latus* D A *part.* 6 18′ 35″, *ex latere* B D *part.* 56 18′ 35″, *& remanebit latus* A B *part.* 50.

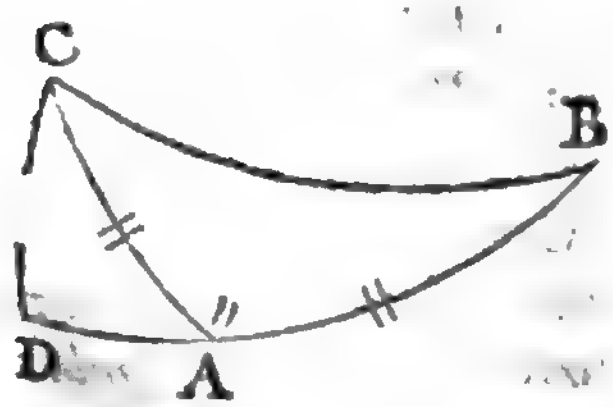
Postre-

Poſtremo, in Triangulo rectangulo A D C *ex dato utroque angulo* C & A, *atque etiam utroque latere* C D & A D, *variis modis pateſcit baſis* A C *part.* 26 22′ 20″; *Quæ fuerunt inveſtiganda.*

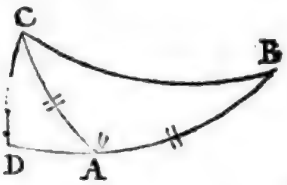
Tertio, datis duobus lateribus, & angulo ab iis comprehenſo, tertium latus, & anguli reliqui innoteſcunt. Perpendicularis enim arcus, à termino lateris alterutrius dati, in reliquum datum (ſi neceſſe ſit productum) emiſſus, obliquangulum triangulum in duo rectangula partitur, ex quorum calculo ignota manifeſtantur.



Eſto obliquangulum Triangulum A B C, *in quo dentur latera* A C *part.* 50, B C *part.* 60, *cum angulo ad* C *ab iis comprehenſo part.* 30. *Perpendicularis* A D *ut ſupra invenitur part.* 22 31′ 15″, *caditque intra Triangulum, ut calculus docebit. Latus enim* C D *in Triangulo rectangulo* A D C, *invenitur per 4 poriſma 12 hujus, vel per alia, quia plura data ſunt, part.* 45 54′ 16″, *minus latere* B C *part.* 60. *Itaque* B D *eſt part.* 14 5′ 44″, *& perpendicularis* A D *intra Triangulum cadit. Porro ex lateribus* A D *&* B D *in Triangulo rectangulo* A D B *cognitis, invenitur baſis* A B, *per 5 poriſma duodecimi hujus, part.* 26 22′ 20″: *Item angulus ad* B, *per tertium poriſma decimitertii hujus, vel per alia, quia plura data ſunt, partium* 59 34′ 21″. *Poſtremo, angulus* B A D *in eodem Triangulo* A D B, *invenitur part.* 33 14′ 53″; *& angulus* D A C *in Triangulo* A D C *part.* 69 38′ 20″. *Ergo angulus* B A C *utriuſque ſumma eſt part.* 102 53′ 13″.



Detur vero in Triangulo obliquangulo A B C *appoſito latera,* A B *partium* 50, A C *part.* 26 22′ 20″, *cum angulo* A *incluſo part.* 102 53′ 13″; *perpendicularis* D C *erit part.* 25 39 32″, *ut ſupra, quadrante minor. Nam angulus* C A D *eſt acutus, reſiduus ſc.* C A B *obtuſi, & baſis* A C *eſt minor quadrante. Itaque perpendicularis arcus* C D *cadit extra. Datur autem in Triangulo* A D C *rectangulo latus* C D

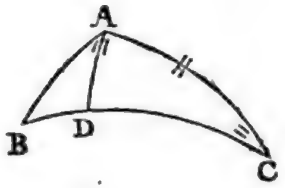


part. 25 39′ 32″, *& angulus ad* A *part.* 77 6′ 47″, *reliquus ſci. anguli* CAB, *ad ſemicirculum: ergo latus* DA *eſt part.* 6 18′ 35″. AB *vero eſt part.* 50: *totus igitur arcus* DAB *eſt part.* 56 18′ 35″.

Secundo, in Triangulo BDC *rectangulo dantur latera,* CD *part.* 25 39′ 32″, & DB *part.* 56 18′ 35″, *ergo baſis* BC *invenitur part.* 60, *angulus ad* C *part.* 30, *& angulus* BCD *part.* 73 53′ 52″.

Tandem in Triangulo ADC *rectangulo, reperitur angulus* ACD *partium* 14 19′ 31″, *qui ſubductus ex angulo* BCD *part.* 73 53′ 52″, *relinquit angulum* ACB *part.* 59 34′ 21″. *Quæ fuerunt indaganda.*

Poſtremo datis duobus angulis, una cum latere utrique adjacente, reliqua latera, & angulus tertius inveſtigantur. Perpendicularis enim arcus ab angulo alterutro in oppoſitum latus (continuatum ſi oportet) egrediens, obliquangulum Triangulum in duo rectangula ſecat, ex quorum calculo quæſita dantur.



Eſto Triangulum ABC *non rectangulum, ſitque angulus ad* A *part.* 102 53′ 13″, *ad* C *part.* 30, *& latus* AC *part.* 50. *Erit* AD *part.* 22 31′ 15″, *latus ſcilicet Trianguli rectanguli* ADC: *& angulus* CAD *part.* 69 38′ 20″, *minor angulo* BAC *dato; ergo reliquus* BAD *eſt partium* 33 14′ 53″, *& proin perpendicularis intra Triangulum cadit. Hinc in Triangulo* ADB *invenitur latus* AB *(ex dato latere* AD, *cum angulo ad* A) *part.* 26 22″ 20″: *item angulus tertius ad* B *part.* 59 34′ 21″, *cum latere* BD, *part.* 14 5′ 44″. *Latus vero* DC *invenitur in Triangulo* ADC, *part.* 45 54′ 16″. *Ergo totum latus* BDC *eſt part.* 60.

Sit verò angulus ad A *in Triangulo appoſito* ABC *part.* 102 53′ 13″, *ad* C *part.* 59 34′ 21″, *& latus* AC *part.* 26 22′ 20″: *invenietur* CD *perpendicularis part.* 25 39′ 32″, *quadrante minor; ergo angulus ad* B, *in Triangulo rectangulo* BDC, *per 9 hujus acutus eſt, & perpendicularis cadit extra; anguli enim ad* A *&* B *ſpecie diverſi ſunt. Hinc reperiuntur,*

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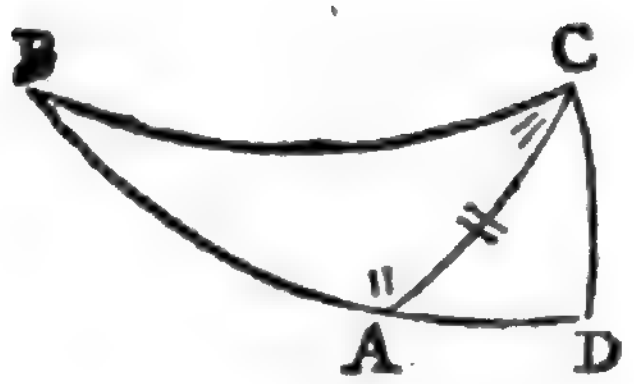
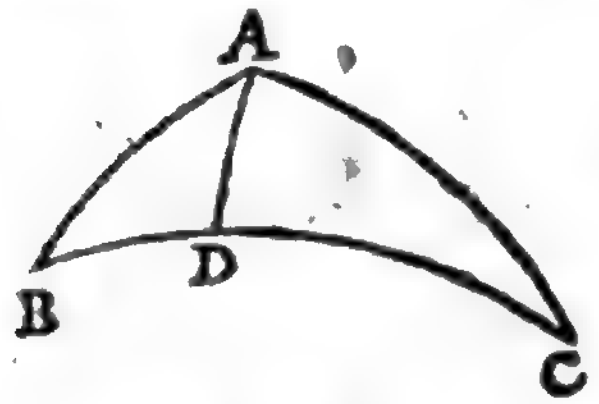


tur, primũ in Triangulo ADC, *latus* DA *part.* 6 18′ 35″, *& in Triangulo* CDB, *latus* DB *part.* 56 18′ 35″. *Auser autem* DA *ex* DB, *& reliquum erit latus* AB *part.* 50. *Adhuc in eodem triangulo* CDB, *invenitur angulus tertius ad* B *part.* 30, *& latus* BC *part.* 60. *Quæ fuerunt indaganda.*

16. In obliquangulo Triangulo ſinus angulorum ſinibus oppoſitorum laterum directe proportionales ſunt.



Eſto ut ſupra obliquangulum Triangulum ABC, *ſectum per* AD *perpendicularem, in duo Triangula rectangula* ADC & ADB; *dico ſinum anguli* B *eſſe ad ſinum lateris oppoſiti* AC, *ut ſinus anguli* C *ad ſinum oppoſiti lateris* AB. *Nam per 7 poriſma* 12 *hujus eſt,*

Vt ſinus ang. B, *ad ſinũ lateris* AD, *ita ſinus ang.* D, *ad ſinũ lat.* AB.

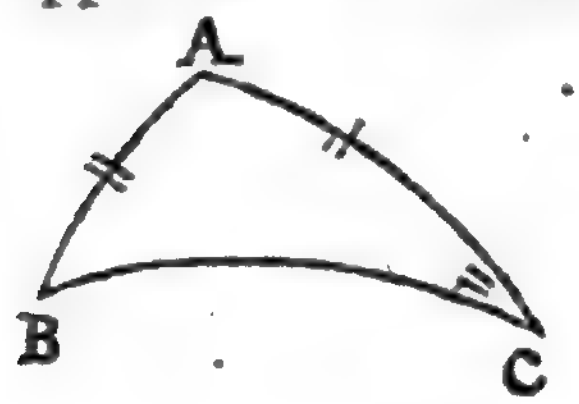
Item ut ſinus ang. C *ad ſinum lateris* AD, *ita ſinus ang.* D, *ad ſinum lateris* AC.

Atqui per 19 *Septimi Euclidis, factus à ſinu* AD *in ſinum ang.* D *æquatur facto à ſinu* B *in ſinum* AB, *& facto à ſinu* C *in ſinum* AC. *Itaque per eandem,*

Vt ſinus ang. B *ad ſinum oppoſiti lateris* AC, *ita ſinus ang.* C *ad ſinum oppoſiti lateris* AC. *Eademque eſt ratio in reliquo angulo* A, *& oppoſito latere* BC. *Quod erat demonſtrandum.*

ΠΟΡΙΣΜΑΤΑ *duo.*

Primum igitur datis duobus lateribus, cum angulo uni datorum laterum oppoſito, manifeſtatur angulus, alteri datorum laterum oppoſitus. Eſt enim ut ſinus lateris dati ad ſinum anguli oppoſiti; ita ſinus lateris alterius dati, ad ſinum anguli oppoſiti.



In exemplo detur in obliquangulo Triangulo ABC *appoſito duo latera,* AB *part.* 26 22′ 20″, AC *part.* 50, *cum angulo ad* C *partium* 30. *Invenietur angulus ad* B *partium* 59 34′ 21″. *Nam*

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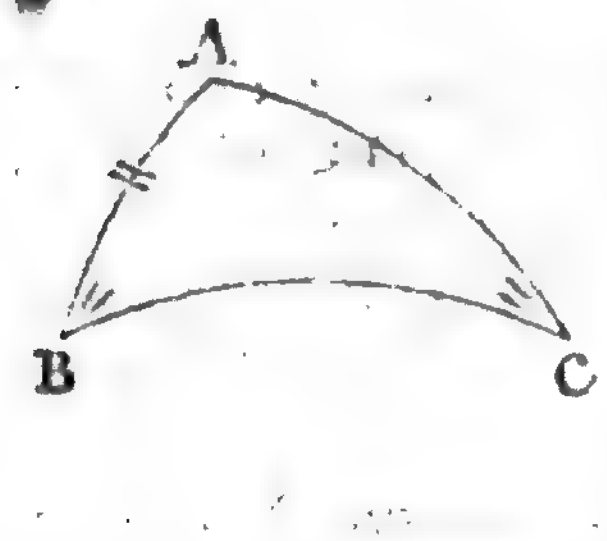
Vt ſinus lateris A B 4442009 *ad ſinum anguli oppoſiti* C 5000000, *ita ſinus lateris* B C 7660445 *ad ſinum anguli oppoſiti* D 8622725, *partium* 59 34′ 21″.

Secundo, datis duobus angulis, cum latere uni datorum angulorum oppoſito, invenitur latus alteri datorum angulorum oppoſitus. Nam ut ſinus anguli dati ad ſinum lateris oppoſiti, ita ſinus alterius anguli dati, ad ſinum lateris oppoſiti.

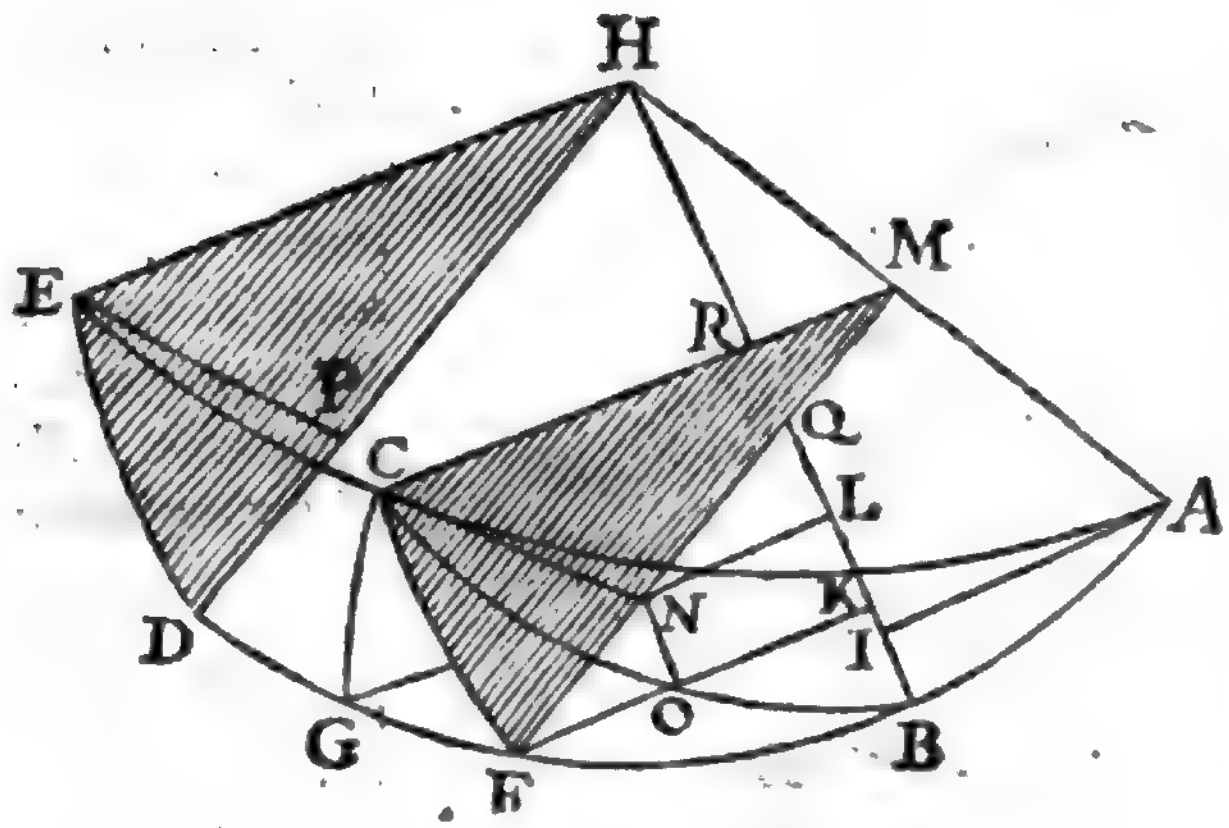


Exempli cauſa, detur in Triangulo obliquangulo A B C *duo anguli, unus ad* C *partium* 30, *alter ad* B *part.* 59 34′ 21″, *cum latere* A B *part.* 26 22′ 20″: *Invenietur* A C *latus part.* 50. *Nam*

Vt ſinus anguli C 5000000, *ad ſinum* A B *lateris oppoſiti* 4442009: *Ita ſinus anguli* B 8622725, *ad ſinum* A C *lateris oppoſiti* 7660445 *part.* 50, *ut ſupra.*

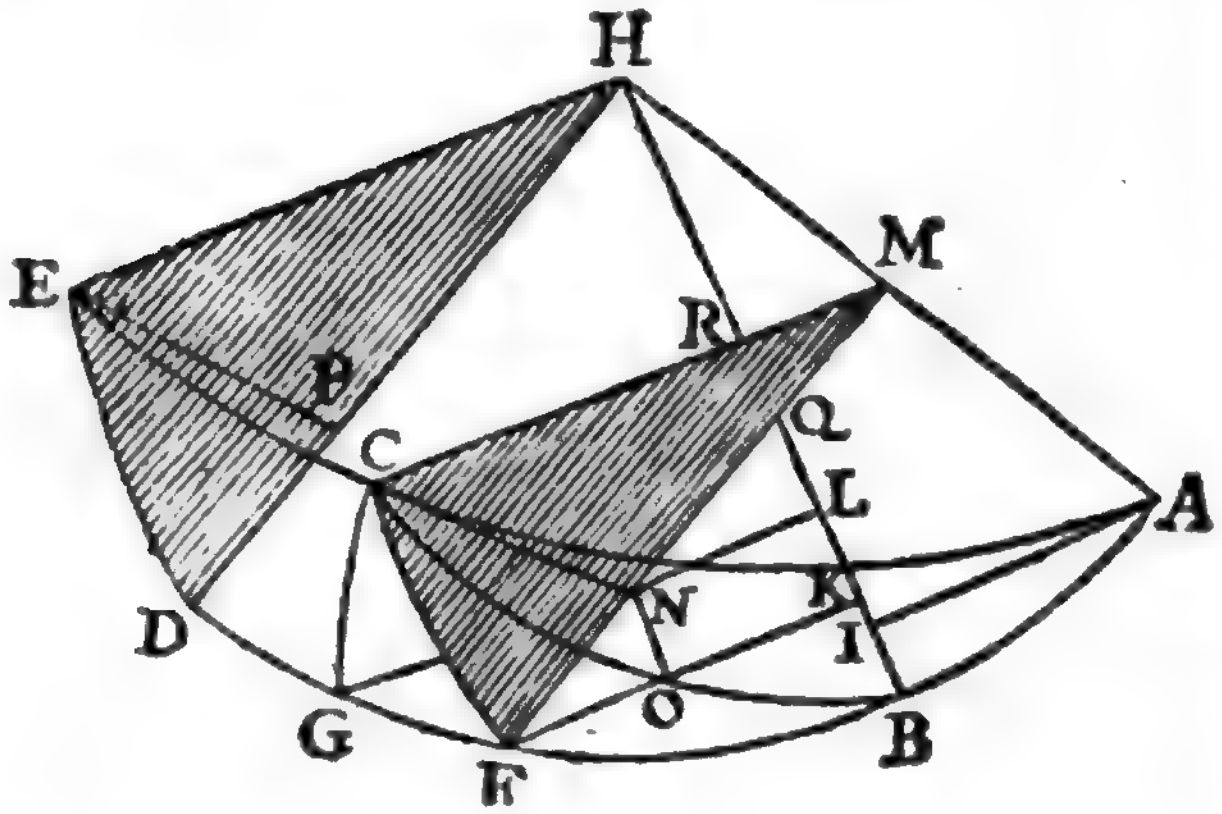
17. In obliquangulo triangulo, quadratum radii eſt ad planum ſinuum rectorum laterum duorum, ut ſinus verſus anguli ab iiſdem comprehenſi, ad differentiam ſinuum verſorum tertii lateris, & reliquorum laterum differentiæ. Quadratum autem radii eſt ad planum ſinuum rectorum angulorum duorum, ut ſinus verſus lateris, utrique angulo adjacentis, ad differentiam ſinuum verſorum tertii anguli, & differentiæ datorum angulorum unius, & alterius ad ſemicirculum complementi.

Hoc Theorema verum eſt in omni Triangulo, tum rectangulo, tum obliquangulo, verum quia uſus ejus potiſſimum eſt in Triangulis obliquangulis, ideo hic de obliquangulis κατ' ἐξοχὴν enumeratur. Sit igitur Sphæricum Triangulum A B C *obliquangulum, cujus latera* A B & A C *inæqualia, & ſigillatim quadrante circuli minora, producantur in* E & D, *ut* A C E & A B D *quadrantes ſint maximorum circulorum. Facto verò* A *polo, deſcribatur arcus* D E *intervallo* A D; & *arcus* C F *intervallo* A F; *erit tunc arcus* D E *per* 8 *hujus menſura anguli ad* A; *arcus verò* A F *æqualis erit arcui* A C. *Item polo* B, & *diſtantiâ* B C *deſcribatur arcus* C G, *qui æqualis*



lis erit arcui B C; *& proinde arcus* B F *differentia erit laterum* A C *&* A B, *& arcus* G F *differentia tertii lateris* B C, *& reliquorum laterum differentiæ* B F. *Emittantur deinde ex* H *communi centro quadrantum* A D *&* A F, *semidiametri* H A, H B, *&* H D, *in puncta* A, B, D; *& à terminis arcuum* A B, B F, *&* B G, *demittantur perpendiculares* A I, F K, *&* G L, *in semidiametrum* H B; *erunt hæ arcuum dictorum recti sinus, per 7 primi hujus;* B I *autem,* B K, *&* B L, *versi sinus eorundem per 10 ejusdem: & proinde* K L *differentia sinuum versorum lateris* B C *vel* B G, *& reliquorum laterum differentiæ* B F. *Præterea à termino arcus* A F *descendat perpendicularis* F M *in semidiametrum* H A, *erit hæc sinus rectus lateris* A F. *Vbi autem* G L *&* F M *sese intersecant sit* N *punctum, ex quo ducatur* N O *parallela* H B; *adeoque per 34 primi elementorum æqualis ipsi* K L. *Adhæc à termino arcus* D E, *demittatur perpendicularis* E P *in semidiametrum* H D, *erit hæc sinus rectus arcus* D E; *&* D P *sinus versus ejusdem. Postremò à* C *communi termino arcuum* F C *&* G C *ducatur recta* C N *in* N, *sectionem rectarum* G L *&* F M; *erit hæc normalis rectis* G N *&* F N. *Arcus enim* F C *&* G C *per 5 hujus normales sunt quadranti* A B D, *transeunti per* A *&* B *polos eorundem. Itaque communis eorum sectio, quæ per 3 undecimi Euclidis est recta linea, nempe* C N, *est plano quadrantis* A B D *normalis, per 19 ejusdem. Transit autem sectio communis arcuum dictorum per* N *punctum, ex conversione definitionis lineæ perpendiculariter super planum erectæ. Quare* C N *est sinus rectus arcus* F C, *&* F N *sinus versus ejusdem.*

His verò in hunc modum expeditis, dico D H *radium esse ad* F M *sinum rectum lateris* A C, *ut* D P *sinus versus anguli ad* A, *ad* F N, *sinum versum arcus* F C. *Item* H A *radium esse ad* A I, *sinum rectum lateris*

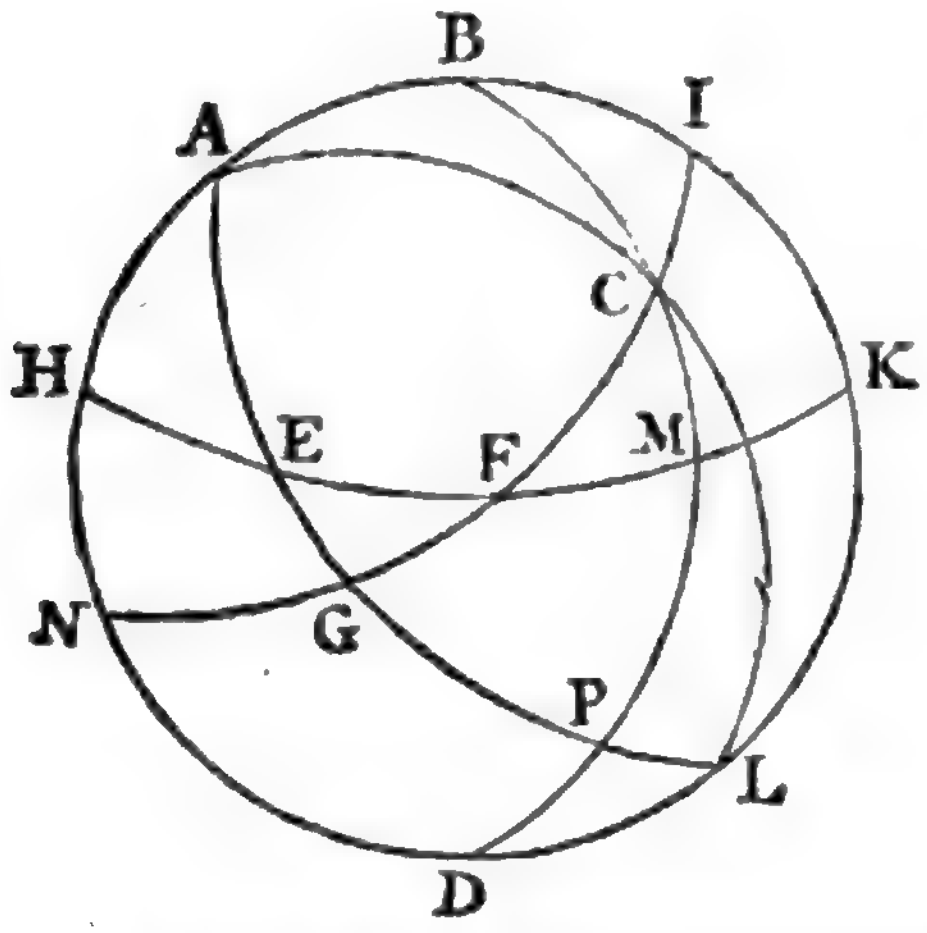


AB, *ut* FN *finus verſus anguli* FC, *ad* NO *differentiam ſinuum verſorum tertii lateris, & reliquorum laterum differentiæ. Hoc eſt, per multiplicationem terminorum, quadratum radii eſſe ad planum finuum rectorum* FM & AI, *ut* DP *ſinus verſus anguli ad* A *ab iiſdem lateribus comprehenſi, ad* NO *differentiam ſinuum verſorum tertii lateris, & reliquorum laterum differentiæ. Triangula enim* HEP, & MCN *ſunt æquiangula, ob rectos angulos ad* P & N, *æqualem ad* H & M, *inclinationis ſcilicet angulum quadrantis* ACE, *ad quadrantem* AFD. *Itaque per* 4 *Sexti Euclidis, latera habent proportionalia. Quare ut* EH *ad* CM, *ita* PH *ad* NM. *Et quia* DH *ex fabrica æquatur ipſi* DH, & FM *ipſi* CM, DH *eſt ad* FM, *ut* PH *ad* NM: *adeoque per* 5 *Quinti Euclidis, ut* DH *ad* FM, *ita* DP *ad* FN. *Secundò Triangula* FON & FKQ & HMQ *ſunt æquiangula, ob rectos angulos ad* O & K, *communem ad* F. *Item triangula* HMQ & HAI *ſunt æquiangula, ob rectos angulos ad* M & I, *communem ad* H; *itaque per* 4 *Sexti elementorum* HA *eſt ad* AI, *ut* FN *ad* NO. *Quod erat demonſtrandum.*

Ita verò patet veritas primæ partis Theorematis hujus. Etſi enim Trianguium propoſitum, laterum ſit quadrante circuli minorum, valet tamen ſuperior ratiocinatio in Triangulis, quorum latera comprehendentia angulum, vel quadrante circuli majora ſunt, vel unum majus, alterum minus. Nam ex 7 *primi hujus, ſinus rectus duabus peripheriis communis eſt, uni, circuli quadrante minori; alteri, quadrante circuli majori. Imo ſi latera æqualia darentur, non abſimilis eſt argumentandi forma, niſi quod* NO *tunc ſit tertii lateris ſinus verſus.*

Secunda porro pars Theorematis, quam jure Nobis vendicamus, quod à Nobis primum inventa ſit, eodem modo demonſtratur quo prima, ſi prius novum deſcribatur Triangulum, per polos laterum Trianguli dati. Hujus enim latera angulis,

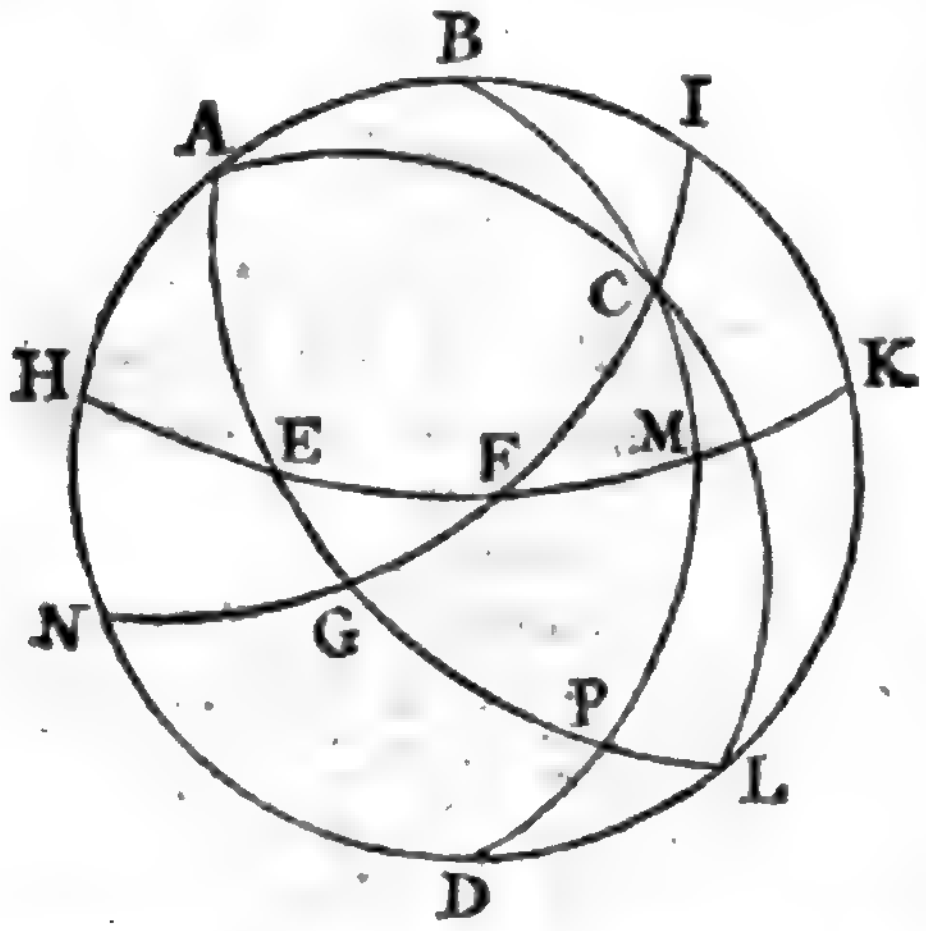
gulis, & anguli lateribus primi Trianguli ità respondent, sit in secunda parte Theorematis eadem ferè ratione argumentari liceat, quâ in prima, sicuti ex sequentibus evadet manifestum.



Sit enim Triangulum A B C *idem quod supra, obtusangulum scilicet ad* B, *acutangulum ad* A *&* C; *& producatur ipsius latus minimum* A B *ex polo* F *in circulum* A K D A: *reliqua vero latera producantur in semicirculos,* A C *quidem ex polo* G *in semicirculum* A C L, B C *autem ex polo* E *in semicirculum* B C D. *Describatur quoque ex polo* A *semicirculus* N F I *transiens per polos* G *&* F; *& ex polo* B *semicirculus* H F K, *transiens per polos* E *&* F; *tandemque ex polo* C *semicirculus* A G L, *transiens per polos* E *&* G; *habebimus tunc novum Triangulum Sphæricum* E F G, *cujus tria latera respondebunt tribus angulis Trianguli* A B C; *& hujus tria latera respondebunt tribus angulis Trianguli* E G F. *Nam quod ad latera Trianguli* E G F *attinet, primum latus* E F *æquale est residuo anguli* A B C *ad semicirculum. Nam* E *est polus semicirculi* B M D, *&* F *est polus semicirculi* B K D, *& proinde* E M *&* F K *sunt circuli quadrantes. Ablato igitur communi medio* F M, *relinquuntur arcus* E F *&* M K *æquales. Atqui* M K *subtendit angulum* M B K *per* 8 *hujus, hoc est residuum anguli* A B C *ad semicirculum. Itaque latus* E F *est æquale residuo anguli* A B C *ad semicirculum.*

Secundo, latus G F *æquatur angulo* B A C. *Nam* F *est polus semicirculi* B K D, *&* G *est polus semicirculi* A C L: *ideoque* G C *&* F I *sunt circuli quadrantes. Remoto igitur communi medio* F C, *remanent arcus* G F *&* C I *æquales. Sed* C I *est mensura anguli* B A C, *per* 8 *hujus. Ergo latus* G F *est æquale angulo* B A C.

Tertio, latus G E *est æquale angulo* A C B. *Nam* G *est polus semicirculi* A C L, *&* E *est polus semicirculi* B M D: *itaque* E P *&* G L *sunt*



ſunt circuli quadrantes. Demp to igitur communi medio G P, *reliqui arcus* E G & P L *æquantur. Sed* P L *metitur angulum ad* C *per octavum hujus, hoc eſt angulum* A C B. *Ergo latus* G E *eſt æquale angulo* A C B.

Atque ita demonſtratum eſt tria latera Trianguli E F G *reſpondere tribus angulis trianguli* A B C. *Quod autem tres anguli trianguli* E F G, *reſpondeant tribus lateribus trianguli* A B C *ita oſtenditur.*

Primò, angulus E F G *æqualis eſt lateri* A B. *Nam* A *eſt polus ſemicirculi* N F I, & B *eſt polus ſemicirculi* H F K. *Itaque* B K & A I *ſunt circuli quadrantes. Quare ablato communi medio* B I, *reſidui arcus* B K & A I *ſunt æquales. Atqui* I K *menſurat per* 8 *hujus angulum* I F K, *id eſt angulum* E F G. *Quare angulus* E F G *eſt æqualis lateri* A B.

Secundo, angulus F E G *eſt æqualis lateri* B C. *Nam* B *eſt polus ſemicirculi* H F K, & C *eſt polus ſemicirculi* A G L. *Quare* D M & P C *ſunt quadrantes circuli; à quibus remoto communi medio* C M, *reſidui arcus* P M & B C *æquantur. At verò* P M *per* 8 *hujus eſt menſura anguli* P E M, *id eſt anguli* F E G. *Quamobrem angulus* F E G *eſt æqualis lateri* B C.

Tertio, angulus E G F *eſt æqualis complemento lateris* A C. *Nam* B *eſt polus ſemicirculi* H F K, & C *eſt polus ſemicirculi* A G L. *Itaque* B G & C G *ſunt circuli quadrantes. Arcus autem* A C, *per* 8 *hujus metitur angulum* A G C, *id eſt* E G F. *Ergo angulus* E G F *æqualis eſt complemento lateris* A C. *Nam quia* E F *non metitur angulum* A B C, *ſed reſiduum ad ſemicirculum* M B K, *idcirco etiam angulus* G *oppoſitus lateri* E F *non metitur latus* A C, *ſed ipſius complementum ad ſemicirculum* C L.

Apparet autem ex hac demonſtratione veritas ſecundæ partis Theorematis noſtri. Nam quia latera & anguli ſecundi Trianguli E F G *reſpondent angulis & lateribus Trianguli primi* A B C, *eo modo quo ante demonſtravimus, ſequi-*

ſequitur ſane ex eo, eandem eſſe proportionem laterum & angulorum in triangulo ſecundo, quæ ſupra demonſtrata eſt in primo. Sunt ergo termini proportionales in primo Triangulo iſti

Primò, ſecundum demonſtrationem primæ partis Theorematis.

8	6	4	3
D H *radius*	F M *ſinus rectus lateris* A C	D P *ſinus verſus anguli dati*	F N *quartus*

8	4	3	1 1/2
A H *radius*	A I *ſinus rectus lateris* A B	F N *quartus*	N O *differentia ſinuum verſorum tertii lateris &c.*

Secundò, per multiplicationem terminorum.

64	24	4	1 1/2
Quadratum radii D H *vel* A H	*Planum ſinuum rectorum* F M & A I	D P *ſinus verſus anguli dati.*	N O *differentia ſinuum verſorum tertii lateris &c.*

Tertiò, per terminorum tranſpoſitionem.

8	6	4	3
A H *radius*	F M *ſinus rectus lateris* A C	A I *ſinus rectus lateris* A B	F N *quartus*

8	3	4	1 1/2
D H *radius*	F N *quartus*	D P *ſinus verſus anguli dati.*	N O *differentia ſinuum &c.*

Tot modis licet variare proportionum terminos, in prima Theorematis parte. Verum quia tertius modus & facilior eſt, & ad uſum maximè accommodatus, idcc eum cæteris prætulimus, & in ſequentibus poriſmatibus uſurpavimus.

ΠΟΡΙΣΜΑΤΑ *quatuor.*

Primum itaque in obliquangulo triangulo, datis duobus lateribus & angulo ab iis comprehenſo, inveſtigatur latus tertium. Radius enim eſt ad ſinum rectum lateris unius dati, ut ſinus rectus lateris alterius dati ad quartum. Item Radius eſt

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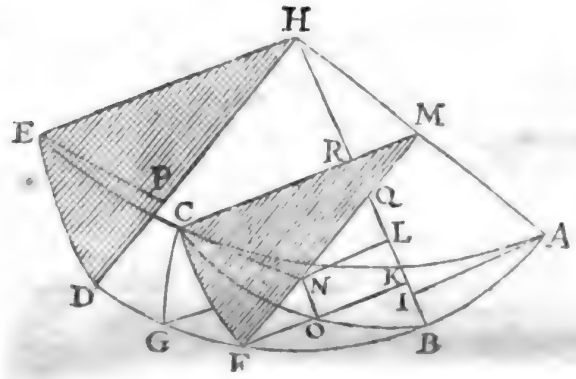
ad quartum, ut ſinus verſus anguli dati ad differentiam ſinuum verſorum tertii lateris, & reliquorum laterum differentiæ. Hæc igitur differentia ad ſinum verſum differentiæ laterum adjecta, componit ſinum verſum lateris quæſiti.



Repetatur penultima noſtra diagrapha, & aſſumatur ut ſupra Triangulum obliquangulum Sphæricum A B C, *in quo dentur duo latera* A B & A C, *cum angulo ad* A *ab iis comprehenſo. Sitque* A B *part.* 50, *& ejus ſinus rectus* A I 7660445; A C *partium* 60, *& ejus ſinus rectus* F M 8660254: A *angulus ab iis comprehenſus part.* 30, *& ſinus ejus verſus* 1339746, *denique ſinus verſus differentiæ datorum laterum (nempe part.* 10) *ſit* 151922. *Propoſitum eſt ex his invenire tertium latus* B C, *dato angulo* A *oppoſitum. Eſt igitur per præſens poriſma,*

ut	A H	*ad* F M,	*ita* A I	*ad* F N	
	10000000	8660254	7660445	6634139.	
Item ut	D H	*ad* F N,	*ita* D P	*ad* N O *vel* L K.	
	10000000	6634139	1339746	888806,	

differentiam ſinuum verſorum tertii lateris, & reliquorum laterum differentiæ. Adjiciatur igitur hæc differentia L K *ad* K B *differentiam ſinuum verſorum datorum laterum* 151922, *& componetur* B L *ſinus verſus lateris tertii quæſiti* 1040728. *Hujus arcus* B C *datur ex Canone Sinuum, part.* 26 22′ 20″. *Auferenim* B L 1040728, *ex radio* 10000000, *& reliquus erit ſinus rectus arcus complementi* B C 8959272, *part.* 63 37′ 40″. *Ergo hujus complementum part.* 26 22′ 20″, *debetur ſinui verſo* B L, *per* 8 *primi hujus, idemque eſt ſinus verſus tertii lateris quæſiti.*

Secundo

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Secundo, datis tribus lateribus, invenitur angulus cuivis lateri oppositus. Nam Radius est ad sinum rectum lateris unius quæsito angulo adjacentis, ut sinus rectus alterius lateris quæsito angulo adjacentis, ad quartum. At quartus est ad radium, ut differentia sinuum versorum tertii lateris & reliquorum laterum differentiæ, ad sinum versum anguli quæsiti.

Manente & hic superiore Trianguli nostri schemate, detur A B *Latus part.* 50, *ejusque rectus sinus* 7660445; A C *part.* 60, *& rectus ejus sinus* 8660254, B C *part.* 26 22″ 20″, *cum* N O 888806, *differentia sinuum versorum tertii lateris* B C (1040728) *&* K B *reliquorum laterum differentiæ (part.* 10, 151922) *invenietur angulus ad* A *part.* 30. *Nam*

ut	A H	*ad*	F M,	*ita*	A I	*ad*	F N
	10000000		8660254,		7660445		6634139
Sed ut	F N	*ad*	D H,	*ita*	N O	*ad*	D E
	6634139		10000000,		888806		1339746, *sinũ*

versum anguli ad C *part.* 30, *omnino ut supra.*

Tertio, datis duobus angulis, & latere utrique adjacente invenitur angulus tertius. Nam radius est ad sinum rectum anguli unius dati, ut sinus rectus alterius anguli dati ad quartum. Item radius est ad quartum, ut sinus versus lateris dati ad differentiam sinuum versorum tertii anguli, & differentiæ anguli unius dati, & alterius ad semicirculum residui. Hæc ergo differentia ad sinum versum differentiæ anguli unius dati, & alterius ad semicirculum residui adjecta, componit sinum versum anguli quæsiti.

Exempli gratia, detur in Triangulo A B C *præmisso, duo anguli* A & B, *cum interjecto latere* A B: *sitque angulus ad* A *part.* 30, *& sinus ejus rectus* 5000000; *angulus ad* B *part.* 102 53′ 13″; *& sinus ejus rectus* 9748131; *latus* A B *part.* 50, *ejusque sinus versus* 3572124; *denique differentia angulorum datorum unius, & alterius ad semicirculum residui part.* 47 6′ 47″, *& ipsius sinus versus* 3194423. *Invenitur ex his, tertius angulus ad* C *part.* 59 34′ 20″. *Nam*

ut	10000000	*ad*	9748131,	*ita*	5000000	*ad*	4874065
	Radius		*sinum rect. ang.* B.		*sinus rect. ang.* A		*Quartum*
Item ut	10000000	*ad*	4874065,	*ita*	3572124	*ad*	1741076 *differentiam*
	Radius		*quartum*		*sinus vers. lat.* A B		

rentiam ſinuum verſorum anguli tertii,& differentiæ anguli unius dati, & reliqui ad ſemicirculum reſidui.

Hæc igitur differentia addita ad ſinum verſum differentiæ anguli unius dati, & alterius ad ſemicirculum complementi 3194423, *componit ſinum verſum anguli ad* C, 4935499 *part.* 59 34′ 21″, *non aliter quam ſupra inventus eſt.*

Poſtremo,datis tribus angulis,manifeſtatur latus cuicunque angulo oppoſitum. Nam radius eſt ad ſinum rectum anguli unius quæſito lateri adjacentis, ut ſinus rectus anguli alterius quæſito lateri adjacentis ad quartum. Sed quartus eſt ad radium,ut differentia ſinuum verſorum tertii anguli,& datorum angulorum unius,& alterius ad ſemicirculum reſidui,ad ſinum verſum lateris quæſiti.

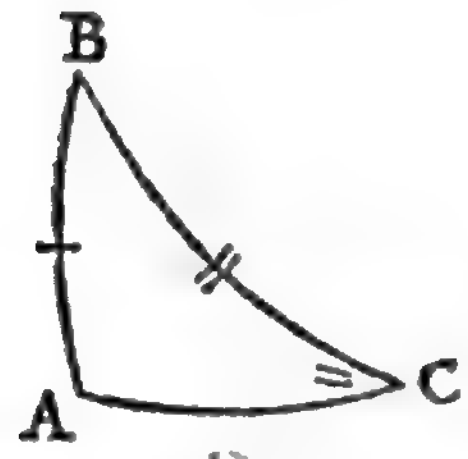
Reſumatur Triangulum A B C *ſphæricum ſuperiùs, denturque in illo tres anguli,* A *partium* 30, *& ſinus ejus rectus* 5000000; B *part.* 102 53′ 13″, *ejuſque ſinus rectus* 9748131; C *part.* 59 34′ 21″: *& proinde differentia anguli* A, *& complementi anguli* B *ad ſemicirculum partium* 47 6′ 47″, *& ſinus illius verſus* 1741072. *Quæritur ex his latus* A B *oppoſitum angulo* C. *Invenitur part.* 50. *Nam*

ut 10000000 *ad* 9748131 *ita* 5000000, *ad* 4874065.
Radius. ſinum rect.ang. B, *ſinus rect.ang.* A *Quartum*

Sed ut 4874065 *ad* 10000000 *ita* 1741072 *ad* 3572124.
Quartus Radium differ.ſin.verſor.&c. ſinum verſum A B *lateris quæſiti part.* 50, *omnino ut ſupra.*

Hucuſque Sphæricorum Triangulorum calculum explicuimus; & ita, ut quæ ſpeciatim ab aliis, & prolixe valde propoſita ſunt, commodius, faciliuſque hinc inveſtigentur. Tuum erit, lector, his uti, quippe ad uſum accommodatis, ad quem ſtudia noſtra omnia referri oportet. Quod ſi quædam conciſa nimis, obſcuraque videantur, tenendum eſt hoc doctrinæ genus attentionem, & indefeſſum ſtudium requirere, etiam quum perſpicue proponitur. Subjicimus verò & hic ſuperioris doctrinæ ſummam in Tabula, ut prompte unumquodque poſtulatum inveſtigari poſſit.

IN

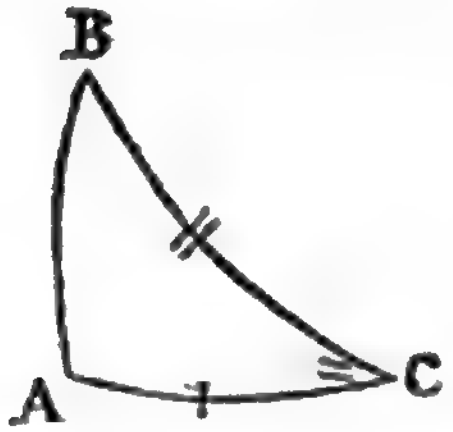


In Triangulo rectangulo invenitur

LATVS,

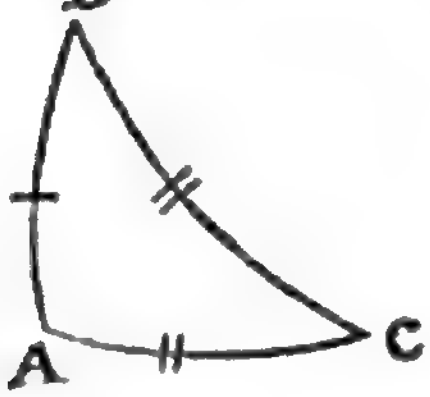
Ex basi, & angulo quæsito lateri opposito, *per primum porisma 12 hujus.*

I	II	III	IIII
ut radius	*ad sinum basis*	*ita sinus ang.*	*ad sinum lat.oppos.*
ut radius	*ad secăt. comp.basis*	*ita sec.compl.ang.*	*ad sec.comp.lat.opp.*
ut sinus basis	*ad radium*	*ita sec.compl.ang.*	*ad sec.comp. lat.opp.*
ut sec.comp.bas.	*ad radium*	*ita sinus ang.*	*ad sin.lat.oppositi.*



Ex basi, & angulo adjacente lateri quæsito, *per quartum porisma 13 hujus.*

I	II	III	IIII
ut radius	*ad sinum comp.ang.*	*ita tang.basis*	*ad tang. lateris*
ut radius	*ad secant. anguli*	*ita tang.comp. bas.*	*ad tang.comp.lat.*
ut sin.comp.ang.	*ad radium*	*ita tang.comp.bas.*	*ad tang.comp.lat.*
ut sec.ang.	*ad radium*	*ita tangens basis*	*ad tang. lateris.*



Ex basi, & altero latere, *per quartum porisma 12 hujus.*

I	II	III	IIII
ut radius	*ad sin.compl.lat.dati,*	*ita secans basis*	*ad sec.reliqui lat.*
ut radius	*ad secantem lat.dati*	*ita sin.comp. bas.*	*ad sin.comp.rel.la.*
ut sin.comp.lat.dati	*ad radium ,*	*ita sin.comp.bas.*	*ad sin.comp.rel.la.*
ut secans lat.dati	*ad radium ,*	*ita secans basis*	*ad sec.reliqui lat.*

Ex an-

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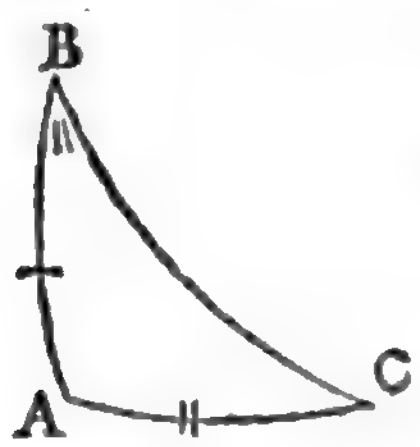
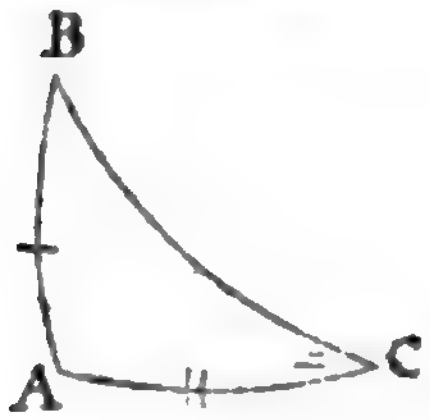


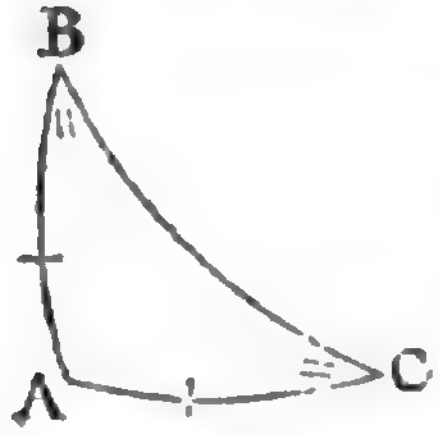
Ex angulo, & latere oppoſito, ſi conſtitèrit quadrantene majus ſit an minus, *per ſecundum poriſma 13 hujus.*

I	II	III	IIII
ut radius	*ad tang. anguli,*	*ita tang.cõp.lat.dati,*	*ad ſec.cõmp.lat.rel.*
ut radius	*ad tang.comp.ang.*	*ita tang. lat. dati,*	*ad ſin. lat. reliqui.*
ut tang. ang.	*ad radium,*	*ita tang. lat. dati,*	*ad ſin. lat. reliqui.*
ut tang.cõp.ang.	*ad radium,*	*ita tang. cõp lat.dati*	*ad ſec.comp. lat.rel.*



Ex angulo, & latere adjacente, *per primum poriſma 13 hujus.*

I	II	III	IIII
ut radius	*ad ſinum lat.dati,*	*ita tang. ang.*	*ad tang.lat.reliq.*
ut radius	*ad ſec.cõp.lat. dati,*	*ita tang.comp.ang.*	*ad tang.cõp.lat.rel.*
ut ſinus lateris dati	*ad radium,*	*ita tang.comp.ang.*	*ad tang.cõp. lat.rel.*
ut ſec.comp.lat.dati	*ad radium,*	*ita tang. anguli*	*ad tang. lat.reliqui.*



Ex utroque angulo obliquo, *per octavum poriſma 12 hujus.*

I	II	III	IIII
ut radius	*ad ſinum ang.unius,*	*ita ſecans ang.alter.*	*ad ſec.later.opp.*
ut radius	*ad ſec. cõp.ang.unius*	*ita ſin. cõp. ang.alt.*	*ad ſin.cõp.lat.opp.*
ut ſin.ang.unius	*ad radium*	*ita ſin.cõp.ang.alt.*	*ad ſin.cõp. lat.opp.*
ut ſec.cõp.ang.uni.	*ad radium*	*ita ſec.ang.reliqui*	*ad ſec.lat.oppoſ.*

BASIS

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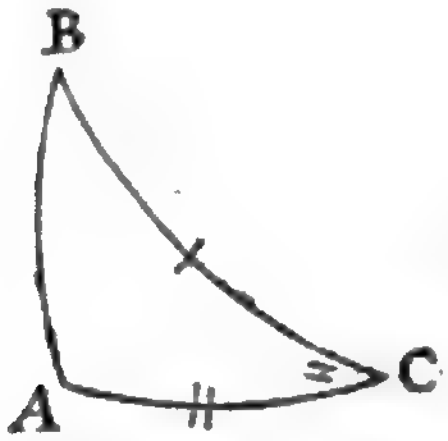
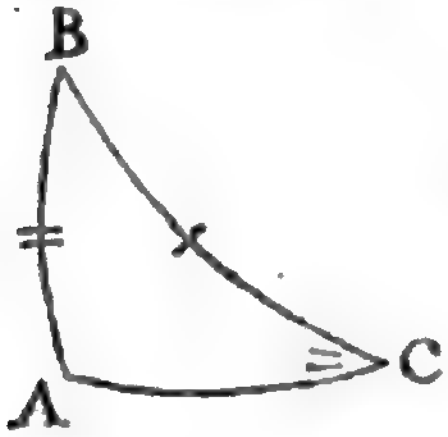


BASIS

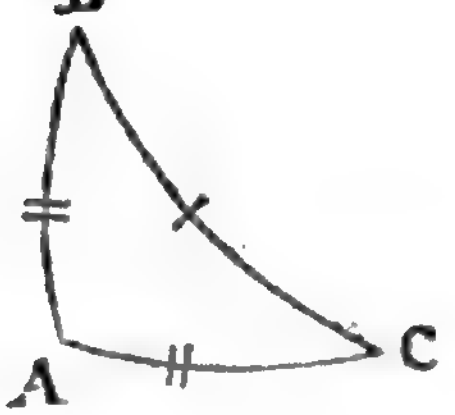
Ex latere & angulo adjacente, *per quintum porisma 13 hujus.*

I	II	III	IIII
ut radius	*ad secant. anguli,*	*ita tang. lateris*	*ad tangent. basis.*
ut radius	*ad sin. comp. ang.*	*ita tang. cõp. lat.*	*ad tang. cõp. basis.*
ut sec. anguli	*ad radium*	*ita tang. cõp. lat.*	*ad tang. cõp. basis.*
ut sin. cõp. ang.	*ad radium*	*ita tang. lateris*	*ad tangent. basis.*



Ex latere & angulo opposito; si constiterit quadrantene major sit, an minor. *per tertium porisma 12 hujus.*

I	II	III	IIII
ut radius	*ad sec. compl. ang.*	*ita sinus lateris*	*ad sinum basis.*
ut radius	*ad sinum anguli,*	*ita sec. comp. lat.*	*ad secant. comp. bas.*
ut sec. cõp. ang.	*ad radium*	*ita sec. comp. lat.*	*ad secant. comp. bas.*
ut sinus anguli	*ad radium,*	*ita sinus lateris*	*ad sinum basis*



Ex utroque latere, *per quintum porisma 12 hujus.*

I	II	III	IIII
ut radius	*ad sec. later. unius,*	*ita sec. lat. alter.*	*ad sec. basis*
ut radius	*ad sin. cõp. lat. unius.*	*ita sin. cõp. lat. alt.*	*ad sinũ comp. bas.*
ut sec. lateris unius,	*ad radium,*	*ita sin. cõp. lat. alt.*	*ad sin. comp. bas.*
ut sin. cõp. lat. unius	*ad radium,*	*ita secans lat. alt.*	*ad secantẽ basis.*

Ex utro-

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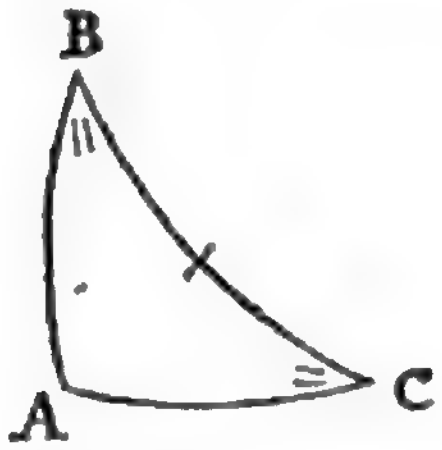
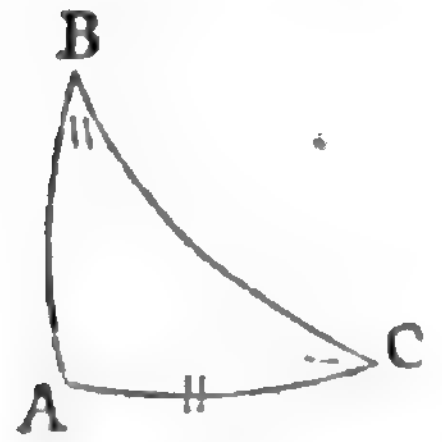


Ex utroque angulo obliquo, *per octavum porisma 13 hujus.*

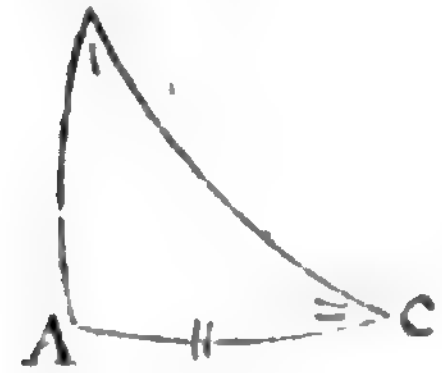
I	II	III	IIII
ut radius	*ad tang.ang.unius,*	*ita tang.ang.alter.*	*ad secantē basis*
ut radius	*ad tang.cōp.ang.uni.*	*ita tāg.cōp.ang.alt.*	*ad sin.cōp. bas.*
ut tang.ang.unius	*ad radium,*	*ita tāg.cōp.ang.alt.*	*ad sin. cōp.bas.*
ut tang.cōp.ang.uni.	*ad radium,*	*ita tang.ang. alter.*	*ad secant.basis.*



ANGVLVS

Ex latere & dato angulo oppofito, *fi fpecies quæfiti anguli nota fit;* per 7 *porifma 12 hujus.*

I	III	III	IIII
ut radius	*ad fecantem lateris*	*ita fin.comp. ang.dati*	*ad finum reliqui*
ut radius	*ad finum comp.lat.*	*ita fecans ang. dati*	*ad fecāt. cōp. reliq.*
ut fecans lat.	*ad radium,*	*ita fecans ang. dati*	*ad fecāt.comp.reli.*
ut finus cōp.lat.	*ad radium,*	*ita fin.comp.ang.dati,*	*ad finum reliqui.*



Ex latere & dato angulo adjacente, *per fextum porifma 12 hujus.*

I	II	III	IIII
ut radius	*ad fecantem lateris,*	*ita fecans comp.ang.*	*ad fec.ang.reliqui*
ut radius	*ad fin.comp. lateris,*	*ita finus anguli dati,*	*ad fin.comp.ang.rel.*
ut fecans lateris	*ad radium,*	*ita finus ang. dati*	*ad fin.comp.ang.rel.*
ut finus cōp.lat.	*ad radium,*	*ita fec. cōp. an.dati,*	*ad fecant. ang.reliq.*

Ex ba-

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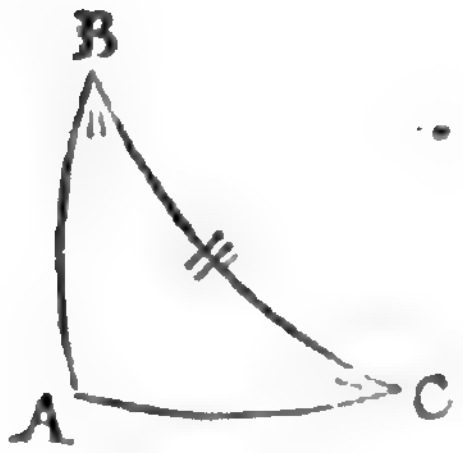
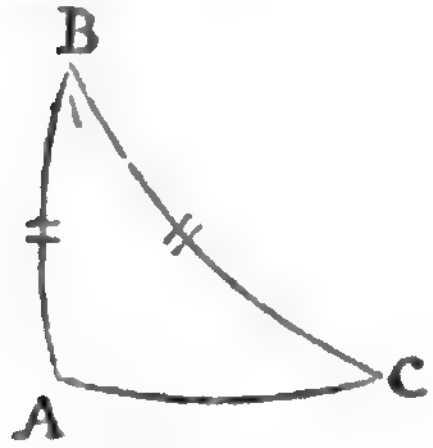


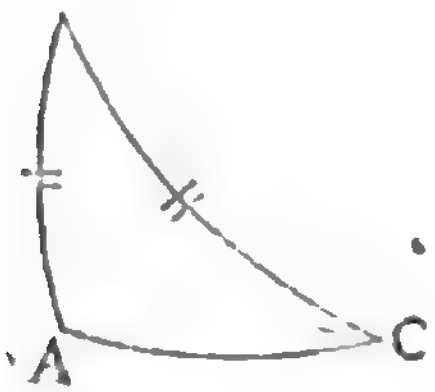
Ex basi & angulo dato, *per 7 porisma 13 hujus.*

I	II	III	IIII
ut radius	*ad secantem basis,*	*ita tãg.compl.ang.dati,*	*ad tang. ang.reliq.*
ut radius	*ad sin.comp.basis,*	*ita tang.anguli dati*	*ad tang. comp.rel.*
ut secans basis	*ad radium,*	*ita tang.anguli dati*	*ad tang. comp.rel.*
ut sin.comp.bas.	*ad radium,*	*ita tãg.compl.ang.dati.*	*ad tang.ang. reliq.*



Ex basi & latere adjacente; *per sextum porisma 13 hujus.*

I	II	III	IIII
ut radius	*ad tang.comp.lat.*	*ita tangens basis*	*ad secant. anguli.*
ut radius	*ad tang.lateris*	*ita tang.comp. bas.*	*ad sinum compl. ang.*
ut tang.lateris	*ad radium,*	*ita tang.comp.bas.*	*ad sinum compl. ang.*
ut tãg.comp.lat.	*ad radium*	*ita tang. basis*	*ad secant. anguli.*



Ex basi & latere opposito; *per secundum porisma 12 hujus.*

I	II	III	IIII
ut radius	*ad secant.comp.bas.*	*ita sinus lateris,*	*ad sinum anguli*
ut radius	*ad sinum basis*	*ita sec.comp.lat.*	*ad sec. comp.ang.*
ut sec.comp.bas.	*ad radium*	*ita sec.comp.lat.*	*ad sec.comp.ang.*
ut sinus basis	*ad radium*	*ita sinus lateris*	*ad sin. anguli.*

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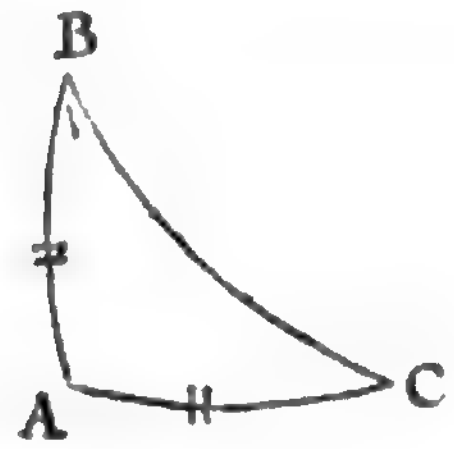


Ex utroque latere; *per tertium porisma 13 hujus.*

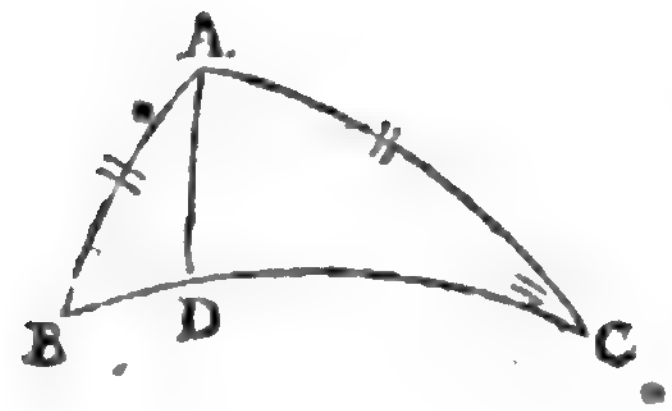
I	II	III	IIII.
ut radius	*ad sec.cõp.Lat.unius,*	*ita tang.Lat.alt.*	*ad tang.ang. oppos.*
ut radius	*ad sinum Lat.unius,*	*ita tãg.cõp.Lat.alt.*	*ad tãg.cõp. ang.op.*
ut sec.cõp.lat.uni.	*ad radium,*	*ita tãg.cõp.Lat.alt.*	*ad tãg. cõp.ang.op.*
ut sinus lat. unius	*ad radium,*	*ita tang.lat.alteri.*	*ad tang. ang.oppos.*

In Obliquangulo Triangulo

inveniuntur

LATVS & ANGVLI DVO.

Ex duobus lateribus, & angulo uni eorum opposito; insuper data specie anguli alteri dato lateri oppositi: *per primum porisma 15 hujus.*



Arcus enim perpendicularis demissus ab angulari puncto datorum laterum in tertium latus, continuatum si necesse sit, secat obliquangulum triangulum datum in duo triangula rectangula: ex quorum calculo quæsita dantur.

ANGV-

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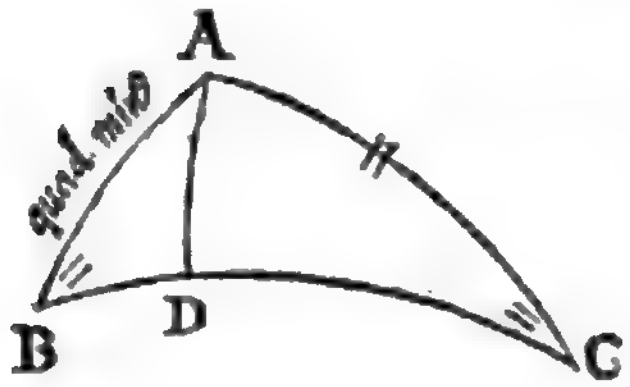
ANGVLVS ET LATERA DVO.

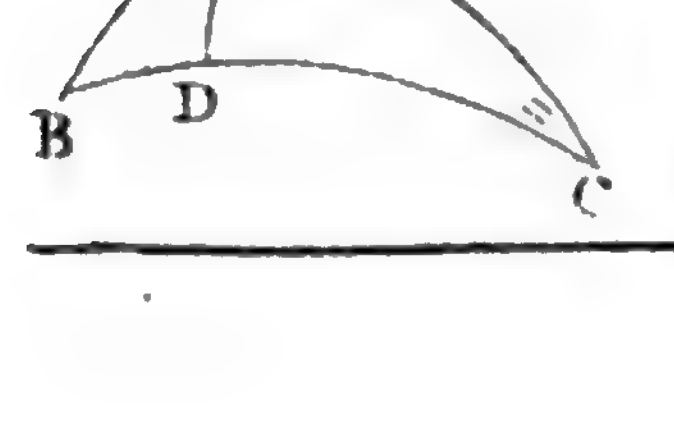
Ex duobus angulis & latere uni eorum oppoſito; ſi conſtet utrum tertium latus quadrante majus ſit, an minus: *per ſecundum poriſma 15 hujus.*



Perpendicularis ſiquidem arcus à termino lateris dati in latus utrique angulo dato adjacens (continuatum ſi oportet) deſcriptus, partitur obliquangulum triangulum datum in duo Triangula rectangula; ex quorum datis poſtulata innoteſcunt.

LATVS ET ANGVLI DVO

Ex duobus lateribus, & angulo ab iis comprehenſo; *per tertium poriſma 15 hujus.*



Arcus enim perpendicularis, à termino lateris unius dati emiſſus in alterum latus datum (productum ſi neceſſe ſit) obliquangulum triangulum in duo triangula rectangula dividit; ex quorum calculo ignota colligantur.

ANGVLVS ET LATERA DVO

Ex duobus angulis & latere utrique angulo adjacente, *per quartum poriſma 15 hujus.*

Nam arcus perpendicularis ab angulo alterutro in oppoſitum latus (continuatum ſi neceſſe ſit) egrediens, obliquangulum Triangulum in duo Triangula rectangula ſecat, ex quorum calculo poſtulata dantur.

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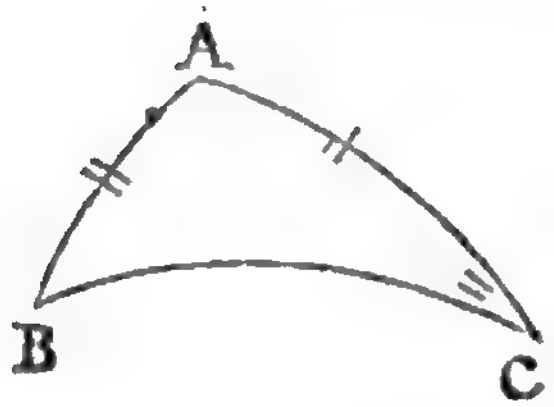
ANGVLVS

Ex duobus lateribus & angulo uni eorum oppoſito ; *per primum poriſma 16 hujus. Nam*

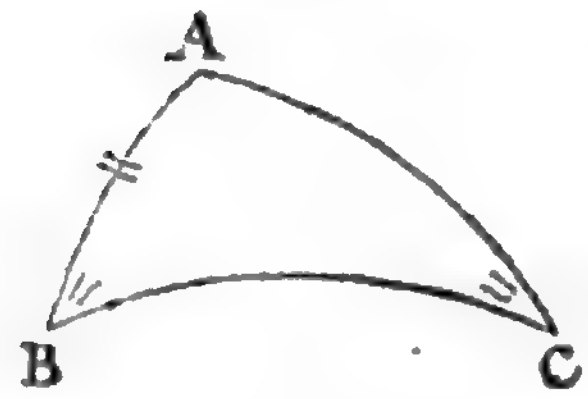


I *Vt ſinus lateris dati,* II *ad ſinum anguli oppoſiti ;*

III *ita ſinus alter. lateris dati, ad ſinum ang. oppoſiti.*

LATVS

Ex duobus angulis, & latere uni eorum oppoſito ; *per ſecundum poriſma 16 hujus. Nam*

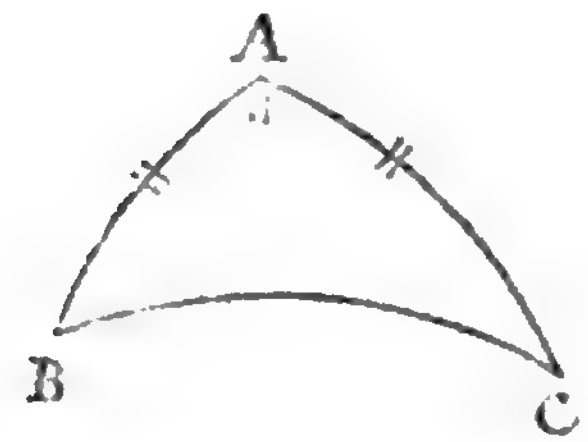


I *Vt ſinus anguli dati,* II *ad ſinum lateris oppoſiti,*

III *ita ſinus alter. ang. dati, ad ſinum lateris oppoſiti.*

LATVS TERTIVM

Ex duobus lateribus, & angulo ab iiſdem comprehenſo ; *per primum poriſma 17 hujus. Nam*



I *Vt radius* II *ad ſinum rectum, lateris unius* III *ita ſinus rectus lateris alterius* IIII *ad quartum.*

I *Vt radius* II *ad quartum* III *ita ſinus verſus anguli dati* IIII *ad differentiam ſinuum verſorum tertii lateris, & reliquorum laterum differentiæ. Hæc vero differen-*

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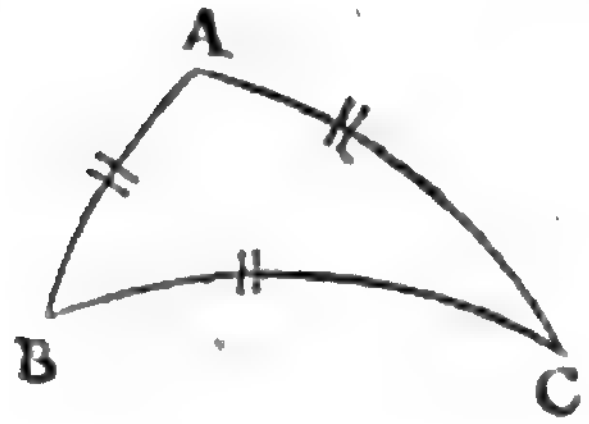
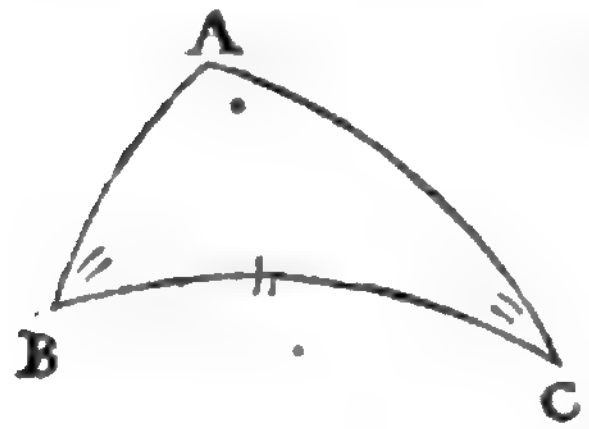
differentia ad ſinum verſum differentiæ laterum adjecta, componit ſinum verſum lateris quæſiti.



ANGVLVS QVIVIS

Ex tribus lateribus; *per ſecundum poriſma 12 hujus. Nam*

I	II	III	IIII
Vt radius	*ad ſinum rectum lat. unius,*	*ita ſinus rectus later. alterius*	*ad quartum.*
I	II	III	IIII
Vt quartus	*ad radium,*	*ita differentia ſinuum verſ. tertii lat. & reliq. laterum differentiæ.*	*ad ſinum verſum ang. quæſiti.*



ANGVLVS TERTIVS.

Ex duobus angulis, & latere utrique angulo adjacente; *per tertium poriſma 17 hujus. Nam*

I	II	III	IIII
Vt radius	*ad ſin. rectum anguli unius,*	*ita ſin. rectus ang. alterius*	*ad quartum*
I	II	III	IIII
Vt radius	*ad quartum*	*ita ſinus verſus lateris dati*	*ad differentiam ſinuum verſorum quæſiti anguli, & differentiæ anguli unius dati, & alterius ad ſemicirculum reſidui. Differentia igitur hæc addita ad ſinum verſum anguli unius dati, & reliqui ad ſemicirculum complementi, componit ſinum verſum anguli quæſiti.*

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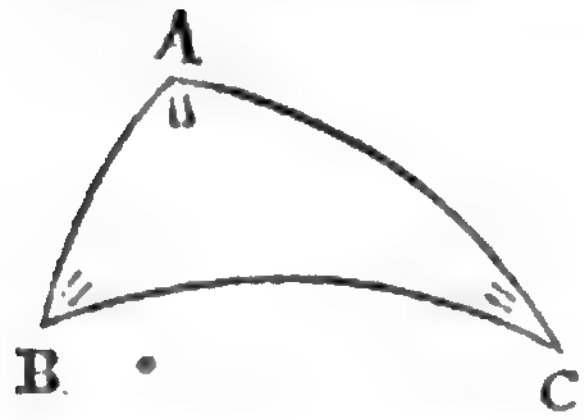

LATVS QVODVIS.

Ex tribus angulis; *per quartum porisma 17 hujus. Nam*

I	II	III	IIII
Vt radius	*ad sinum rectum anguli unius,*	*ita sinus rectus ang. alterius*	*ad quartum*
II	II	III	IIII
Vt quartus	*ad radium,*	*ita differentia sinuum vers. tertiæ ang. & differentiæ ang. unius, & alterius ad semicirculum residui.*	*ad sinum versum lateris quæsiti.*

BIBLIOTECA NAZ. ROMA

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IV-4

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